Appendix B

CMS Report - Soil

OBG

FINAL REPORT

Corrective Measures Study Report - Soil

GE Aviation – Evendale Facility Evendale, Hamilton County, Ohio

June 2017



JUNE 2017 | 612 | 60834

OBG

Corrective Measures Study Report - Soil

GE Aviation – Evendale Facility Evendale, Hamilton County, Ohio

Prepared for: GE Aviation

DOUGLAS M. CRAWFORD, PE, VP O'BRIEN & GERE ENGINEERS, INC.

TABLE OF CONTENTS

1. Introduction	1
1. Introduction	1
1.1.1 SWMUs/AOCs and Impacted Environmental Media	1
1.2 Objective	1
1.2.1 Technical Approach	1
2. Soil Exposure Pathway Analysis	3
2.1 Screening Assessment	3
2.1.1 General Approach	3
2.1.2 Identification of COPCs	4
2.1.3 Background Considerations	4
2.2 Development of Risk-Based Soil Cleanup Goals	
2.2.1 Current and Reasonably Anticipated Future Land Use	8
2.2.2 Current and Future Potential Receptors	
2.2.3 Exposure Routes	
2.2.4 Risk-Based Cleanup Goal Calculations	9
2.3 Application to Institutional and Engineering controls	10
3. Summary and Conclusions	12
4. References	13

List of Tables

- 1 Screening Evaluation Summary for SWMUs/AOCs
- 2 Benzene Data Summary for SWMUs/AOCs Where TPH is Identified as a COPC
- 3 Calculated Risk-Based Soil Cleanup Goals for COPCs
- 4 Summary of SWMUs/AOCs Identified for No Further Action and SWMU Management Controls
- 5 Summary of SWMUs/AOCs Identified for SWMU Management Controls and Soil Corrective Measures Objectives

List of Figures

- 1 SWMUs and AOCs Recommended in the RFI for Further Evaluation
- 2 SWMUs and AOCs Results of Screening Against Residential RSLs & Background Metals
- 3 SWMUs and AOCs Detail of Soil Analytical Concentrations Above Screening Values & Background Metals
- 4 Human Health Conceptual Site Model
- 5 SWMUs/AOCs Identified for No Further Action and SWMU Management Controls

List of Appendices

- A Screening Tables for Soil Concentrations at SWMUs/AOCs
- B Natural Resources Conservation Service Soil Survey Map GE-Evendale Facility
- C Risk-Based Soil Cleanup Goals for Facility COPCs



1. INTRODUCTION

As outlined in the USEPA-approved Corrective Measures Study (CMS) Work Plan (O'Brien & Gere [OBG], 2014), this Interim Report summarizes the soil exposure pathway evaluation associated with a future Institutional and Engineering Controls (I&EC) program for the GE Aviation facility (Facility) located in Evendale, Ohio (Figure 1). Although several affected environmental media are addressed in the CMS Work Plan, only the soil exposure pathway is discussed within this Interim Report.

1.1 BACKGROUND

The GE Aviation facility is located on an approximately 400-acre site in southwestern Ohio's Hamilton County, approximately ten miles north of Cincinnati. The Facility is a secure, highly active, long-term manufacturing facility located within the heavily industrialized I-75 corridor between Cincinnati and Evendale, Ohio. The Facility has been used for military and commercial aircraft engine manufacturing since the 1940s. Due to established site security and continued future industrial use, institutional and engineering land use controls are anticipated to be sufficient to control potential exposure to chemical constituents through the soil exposure pathway.

1.1.1 SWMUs/AOCs and Impacted Environmental Media

Based on the USEPA's 1989 Facility-wide Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA), there were 135 solid waste management units (SWMUs) and 20 areas of concern (AOCs) identified at the Facility.

As described in the approved CMS Work Plan, there are 49 SWMUs/AOCs remaining that require further evaluation based on data collected during the Remedial Facility Investigation (RFI). Those remaining SWMUs/AOCs are listed in Table 1 and shown in Figure 1.

Impacted environmental media associated with the remaining SWMUs/AOCs at the Facility include soil, soil vapor, and groundwater. The major groups of chemical constituents associated with these SWMUs/AOCs include volatile organic compounds (VOCs), total petroleum hydrocarbons (TPH), semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and metals.

1.2 OBJECTIVE

The objective of this CMS Report - Soil is to develop the framework, including soil exposure pathway evaluation and risk-based cleanup goals, for soil risk management decisions at SWMUs/AOCs.

1.2.1 Technical Approach

The technical approach used to meet the objective is as follows:

- Summarize the constituent concentrations for specific SWMUs/AOCs or SWMU/AOC areas
- Screen existing soil data against USEPA Regional Screening Levels (RSLs)¹ for soil
- Present a human health conceptual site model (CSM) that identifies the current and future potential receptors and exposure routes (dermal, inhalation, ingestion) for impacted soil
- Develop soil cleanup goals using current and reasonably anticipated future land use assumptions, with consideration to grouping of SWMUs/AOCs into certain areas based on geographic location. It is anticipated that these soil cleanup goals will form the basis for future development of soil corrective measures objectives (CMOs) and, ultimately, I&ECs for the Facility.

¹ Note that RSLs are a generic screening criterion and that development of site-specific screening criteria may be warranted, either as a follow-up to this evaluation, or at some future time if there is interest in repurposing and change-of-use of select areas.



GE AVIATION - CORRECTIVE MEASURES STUDY REPORT - SOIL | FINAL

The results from the soil pathway analysis presented in this Interim Report will be used to develop a practical approach to soil risk management. The CMOs and I&ECs developed during the CMS will be presented in an I&EC Plan to be submitted under separate cover. The I&EC Plan will include guidelines for soil disturbance and management. The I&EC Plan will be maintained by the Facility and updated as needed.



2. SOIL EXPOSURE PATHWAY ANALYSIS

This soil pathway evaluation compares Facility data to current USEPA Regional Screening Levels (RSLs), updated most recently in May 2016 (USEPA, 2016). RSLs are derived from risk-based calculations that set concentration limits based on conservative assumptions regarding human exposures and effects on carcinogenic and/or noncarcinogenic toxicity endpoints.

2.1 SCREENING ASSESSMENT

2.1.1 General Approach

The Evendale Facility is currently used for industrial purposes and is likely to continue as an industrial facility for the foreseeable future; therefore, Industrial Soil RSLs are considered the most applicable comparative screening levels for evaluating soil data at the Facility. However, constituents of potential concern (COPCs) were identified by comparing maximum concentrations of chemicals in each retained² SWMU/AOC to Resident Soil RSLs. This represents a highly conservative approach to identifying COPCs given that most or possibly all the facility will continue to be used for industrial purposes.

SWMUs/AOCs retained from the RFI are shown on Figure 1, with the following exception.

SWMU 118 (IRP Site SD-23) (Process Sewer System – Sanitary Sewer) was investigated during the RFI and it was concluded that the sanitary sewers were not a significant source of impact to soils or groundwater (OBG, 1995). This conclusion was based on the RFI results as well as the periodic monitoring by GE for compliance with the sewer use ordinance (sanitary wastewater is discharged to the local POTW). During the RFI, sanitary sewer lines near Former Building F and C on the former USAF parcel on the southern end of the Facility (referred to as former AFP36) were targeted for sediment sampling because they historically received outflow from various process streams. Due to its location on AFP36, the 1995 RFI recommended further action under the USAF Installation Restoration Program (IRP). In 2000, USAF concluded that reported PCB concentrations (0.596 to 1.502 mg/kg) were below USEPA Region III risk-based concentrations for industrial soil and no further action was recommended (Earth Tech, 2000). In addition to sanitary sewer use compliance, sewer access by site workers is addressed under Facility health and safety procedures and practices to mitigate human exposure to materials within the sanitary sewer. Sanitary sewers on and in the immediate vicinity of former AFP36 are located at depths in the range of 10 to 25 feet below ground (fbg). Buildings on the former AFP36 parcel have been demolished and decommissioned. Based on the sanitary sewer depth, inaccessibility, sewer use compliance, and facility worker safety procedures in place, SWMU-118 was not retained for further evaluation in this soil pathway evaluation.

The general approach for selecting COPCs was based on comparison to RSLs. If the maximum detected concentration of a given chemical is less than its respective RSL, it is concluded that exposure to the chemical does not represent an unacceptable risk to human health, and soil remediation based on potential human exposure to this chemical is not warranted. Accordingly, the development of site-specific risk-based soil cleanup levels are not warranted for these chemicals. If the maximum detected concentration of a given chemical is above its respective RSL, the chemical is identified as a COPC and a numerical risk-based cleanup level will be developed. Consideration of TPH required a more in-depth evaluation of the constituents:

It should be noted that for TPH, six fractions (aliphatics – low, medium, high; aromatics – low, medium, high) based on the number of carbon atoms were assigned by the USEPA as representative compounds for determination of toxicity values and chemical-specific parameters to calculate RSLs for TPH (USEPA, 2009a). Because the relative fractions of aliphatics and aromatics (and the associated number of carbon atoms in each fraction) in RFI soil samples of TPH are not definitively known, for laboratory reported results for TPH, the

² The RFI results identified (retained) certain SWMUs/AOCs for further evaluation. Table 1 of the approved CMS Work Plan (OBG, 2014) shows the retained SWMUs/AOCs and the COPCs with concentrations greater than RFI screening levels for the retained SWMU/AOC.



OBG | JUNE 2017

minimum (most conservative) RSL for the six representative fractions was used as the RSL (aromatic-low) for screening of TPH soil concentrations.

■ TPH comprise a mixture of petroleum-based compounds typically consisting of both short and long carbon chains. TPH mixtures consist primarily of SVOCs and VOCs, with differing proportions based on petroleum type. Notable is that the RSLs for the six TPH fractions are based on toxicity data related to non-carcinogenic endpoints; therefore, there is some uncertainty associated with the RSLs in that they are not reflective of potential carcinogenic effects. Given these considerations, SWMU/AOC-specific data from the GE-Evendale Facility were reviewed to evaluate the presence or absence of benzene, a carcinogenic substance sometimes present in TPH, particularly in low carbon range aromatics. The results of this review indicated that the majority of the SWMUs/AOCs where TPH is identified as a COPC (see Section 2.1.2) were also sampled for benzene. Benzene was detected in just four of 57 samples; in each instance of a detection, the benzene concentration was below its Resident Soil RSL (Table 2). Consequently, the most stringent RSL from the six TPH fractions (aromatic-low fraction) is an appropriately conservative comparative value for screening TPH in Facility soils. Additional discussion regarding the application of toxicity data for deriving risk-based soil cleanup goals for TPH is provided in Section 2.2.4.

2.1.2 Identification of COPCs

Screening tables for each of the Facility SWMUs and AOCs retained from the RFI for additional evaluation are provided in Appendix A. As discussed in Section 2.1.1, the Resident Soil RSLs are the primary screening values used to evaluate the need to develop soil cleanup goals. The screening tables provided in Appendix A include comparisons of RFI sample-specific concentrations to the Resident Soil RSLs, to provide perspective on the soil quality at each sample location within the SWMUs/AOCs. Note that in some cases, some SWMUs/AOCs were grouped based on the close proximity of sample locations in these areas.

Based on the comparisons of detected chemicals to Resident Soil RSLs for each SWMU/AOC, a total of 20 COPCs were identified. These COPCs consist of several different chemical classes, including metals (antimony, arsenic, cadmium, cobalt, copper, lead, manganese, nickel, and vanadium), cyanide, polycyclic aromatic hydrocarbons (PAHs), PCBs, VOCs (trichloroethene [TCE], vinyl chloride), and TPH.

Table 1 presents a summary of the chemicals identified as COPCs in each SWMU/AOC group. Figure 2 presents a breakout of SWMUs/AOCs with chemical concentrations above or below Resident Soil RSLs (and background concentrations, see Section 2.1.3 below). The COPCs with concentrations above Resident Soil RSLs and background are identified for each SWMU/AOC in Figure 3.

SWMU 118 was not retained for further analysis for reasons discussed above in Section 2.1.1.

2.1.3 Background Considerations

Concentrations of metals identified as COPCs (antimony, arsenic, cadmium, cobalt, copper, lead, manganese, nickel, and vanadium) were furthered evaluated with respect to background soil concentrations. A report developed by the Ohio Environmental Protection Agency (Ohio EPA) entitled *Evaluation of Background Metal Soil Concentrations in Hamilton County - Cincinnati Area* (Ohio EPA, 2015) was used as the most applicable document to obtain local background soil concentrations to compare to COPC metal concentrations in each applicable SWMU/AOC. It should be noted that GE conducted background soil sampling of 24 metals at the Facility as part of the RFI; however, these data were obtained from a limited number of on-site locations (three) and thus the more recent Ohio EPA study was used to provide for a more robust comparison with the SWMU/AOC soil concentrations.

An overview of the 2015 Ohio EPA background soil study and a discussion of the comparisons of the SWMU/AOC-specific background concentrations to the Ohio EPA background levels are provided below.



2015 Ohio EPA Background Study - Overview

The 2015 Ohio EPA background soil study for Hamilton County evaluated select metals in urban, suburban and rural surface soils to build a dataset that can be used to support the remediation of Brownfield properties under the Ohio Voluntary Action Program (VAP). Surficial soil samples collected to derive Ohio EPA background levels of metals include urban soils from within the City of Cincinnati and adjacent municipalities, and soils from suburban metro parks and rural areas. Properties evaluated for background soil sampling included public parks not underlain by engineered or structural fill or industrial fill, where industrial or waste disposal activities have not occurred, and where soils are not likely influenced by historical releases, roadways, stormwater runoff, railroad tracks, and parking lots. Properties selected for background sampling incorporate as many of the 12 soil mapping units identified in the Cincinnati area as possible to provide a background metal dataset that is representative of the soils present in the Cincinnati area. A United States Department of Agriculture-Natural Resources Conservation Service (NRCS) Soil Survey Map of the Site identified three primary soil mapping units at the Site: Urban Land, Patton, and Russell (Appendix B). These three soil units were among the 12 incorporated into the Ohio EPA background sampling program. Additionally, soils evaluated in the Ohio EPA background study were formed on silt and clay-rich glacial till, similar to soils within the uppermost formation at the Evendale Site (O'Brien & Gere 1995). The Ohio EPA asserted that the background soil results from its report are usable for direct comparison to other properties in Hamilton County. Based on the above information, the background soil data presented in the 2015 Ohio EPA report are considered appropriate for application to those evaluated at the Site.

Background Screening - Arsenic, Lead, and Nickel

Upper tolerance limits (UTLs) are commonly used to establish a background threshold value, and provide a reasonable upper limit for what is likely to be observed in background. Of the metals evaluated in the 2015 Ohio EPA study, Hamilton County background values were available for three (arsenic, lead, and nickel) of the nine metals identified as COPCs in Facility soils. The Ohio EPA determined that the 95% UTL for arsenic and nickel was the most appropriate estimator of representative background conditions for these metals in Hamilton County soils based on data distributions, frequency of non-detected concentrations, presence of outliers, and other statistical considerations (Ohio EPA 2015). Concentrations of arsenic and nickel, as applicable, from individual sampling locations within the SWMUs/AOCs were compared with the Ohio EPA background statistic (i.e., the 95% UTL) for these metals. The 95% UTLs established by Ohio EPA for the Cincinnati area are presented below:

Metal	95% UTL Background Concentration (mg/kg)
Arsenic	12.9
Lead	32.9
Nickel	14.8

The following describes the results of the background screening for arsenic, lead, and nickel:

Of the 22 SWMUs/AOCs in which arsenic was identified as a COPC in soil samples, arsenic concentrations in 17 SWMUs/AOCs are consistent with or lower than the above-listed local background concentration (Table 1)³. Therefore, arsenic is retained as a COPC in 5 SWMUs at the Facility (SWMUs 16, 17, 18, 27/28, and 124). Arsenic concentrations in these 5 SWMUs ranged from 2.8 to 23.5 mg/kg. Cincinnati area background data for arsenic are variable, with concentrations ranging from 4.1 mg/kg to 14.3 mg/kg (Ohio EPA, 2015).

³ Two samples collected in SWMU 8/12 contained concentrations of arsenic above Resident Soil RSL and the Cincinnati-area background concentration; however, these samples were collected from the 16-18 foot depth interval, beyond the depth at which human exposures can occur via the exposure pathways included in this analysis.



- Lead was identified as a COPC based on one sample concentration greater than the Resident Soil RSL in SWMU 29 (Table 1; Appendix A, Table A-10). The Cincinnati-area background concentrations of lead ranged from 11.4 mg/kg to 34.2 mg/kg.
- Nickel was identified as a COPC in a single SWMU (SWMU 21/22) as indicated in Table 1 and Appendix A, Table A-8. The Cincinnati-area background concentrations of nickel ranged from 6.7 mg/kg to 17.2 mg/kg. Although nickel concentrations were greater than the Cincinnati area background UTL value in three instances at SWMU 21/22, these concentrations occurred in soils at depths of 16 feet or greater, beyond the range at which human contact typically occurs. All nickel concentrations within the interval of likely human exposure (e.g., within feet below ground surface) were lower than the corresponding Resident Soil RSL. Based on these considerations, nickel is not retained as a COPC at SWMU 21/22.

Based on the background evaluations described above, arsenic and lead are retained as COPCs.

Background Screening - Cadmium, Cobalt, Copper, Manganese, and Vanadium

As described above, the Ohio EPA background study for Hamilton County (Ohio EPA, 2015) did not derive background concentrations for other metals identified as COPCs. However, background data from 64 environmental projects conducted between 1984 and 1994 in 36 of the 88 Ohio counties were made available by various Ohio EPA district offices and used by Cox-Colvin Associates, Inc. (on behalf of the Ohio EPA) to derive statewide background values for several metals (Cox-Colvin & Associates, 1996). The Ohio EPA Division of Hazardous Waste Management (DWM) coordinated the selection of the reports to be included in the 1996 background study. In some cases, the Ohio EPA District Offices requested that specific sites be removed from the database based on the location of the background samples. Statistical analyses were applied to the data to identify data distributions, detect potential outliers, and generate summary statistics. Upper-bound mean concentrations (e.g., 95% UTLs) were not calculated in the 1996 study. As such, geometric mean concentrations of select background metals (cadmium, cobalt, copper, and manganese) developed from the 1996 background study were used for comparison to concentrations of these metals in applicable SWMUs/AOCs.

The geometric mean statewide background values developed for the Ohio EPA are presented below:

Metal	Geometric Mean Background Concentration $({ m mg/kg})$
Cadmium	0.51
Cobalt	6.4
Copper	11.8
Manganese	459
Vanadium	17.4

Comparisons of SWMU/AOC concentrations to the geometric mean values yielded the following results:

- <u>Cadmium</u>: this metal was identified as a COPC in SWMUs 14, 21/22, and 79 (Table 1). Concentrations of cadmium above the Resident Soil RSL in these SWMUs were also above the statewide geometric mean background concentration (Appendix A, Tables A-2, A-8, and A-14). Notable is that the single sample concentration above the Resident Soil RSL in SWMU 21/22 is at a depth range unlikely to be contacted by human receptors (18-20 feet below ground surface). All other cadmium concentrations in SWMU 21/22 are below the RSL.
- Cobalt: this metal was identified as a COPC in SWMUs 8/12, 17, 21/22, 79, and 142 (Table 1). Concentrations of cobalt above the Resident Soil RSL in these SMWUs were also above the statewide geometric mean background concentration (Appendix A, Tables A-1, A-4, A-8, and A-25). Notable is that the single sample concentration above the Resident Soil RSL in SWMU 21/22 is at a depth range unlikely to be contacted by receptors (18-20 feet below ground surface). All other cobalt concentrations in SWMU 21/22 are below the RSL.



- Copper: this metal was identified as a COPC in SWMUs 21/22 and 31 (Table 1). Concentrations of copper above the Resident Soil RSL in these SMWUs were also above the statewide geometric mean background concentration (Appendix A, Tables A-8 and A-11). It should be noted that the single sample concentration of copper above the Resident Soil RSL in SWMU 21/22 is at18-20 feet below ground surface, beyond the depth human exposure may occur. All other copper concentrations are below the RSL.
- Manganese: this metal was identified as a COPC in SWMUs 19, 20, and 29 (Table 1). Concentrations of manganese above the Resident Soil RSL in these SMWUs were also above the statewide geometric mean background concentration (Appendix A, Tables A-6, A-7. and A-10).
- <u>Vanadium</u>: this metal was identified as a COPC based on a single sample concentration in SWMU 29 (Table 1). This sample concentration was greater than the statewide geometric mean background concentration (Appendix A, Table A-10).

Based on the background evaluations described above, cadmium, cobalt, copper, manganese, and vanadium are retained as COPCs.

Background Screening - Antimony

Although the 1996 Ohio statewide background study compiled soil concentration data for antimony, elevated detection limits prevented the development of a suitable background statistic for this metal (Cox-Colvin & Associates, 1996). Given this constraint, other sources of information were sought for naturally occurring levels of antimony in soil. Shacklette and Boerngen (1984), as part of a United States Geological Survey (USGS) desktop study, report a geometric mean antimony concentration of 0.52 mg/kg as naturally occurring in eastern United States soils.

Antimony was identified as a COPC in SWMU 21/22 (Table 1). The single concentration of antimony above the Resident Soil RSL in this SMWU was also above the USGS background concentration of 0.52 mg/kg (Appendix A, Table A-8); however, this sample concentration was detected 18-20 feet below ground surface, beyond the depth human exposures are likely to occur. All other antimony concentrations are below the RSL. Therefore, antimony is not retained as a COPC.

2.2 DEVELOPMENT OF RISK-BASED SOIL CLEANUP GOALS

The development of risk-based cleanup goals for soil incorporates considerations of several factors, including the nature and magnitude of COPCs, current and likely future land use, exposure pathways and receptors, toxicity information, and target hazard and risk levels. The approach used to develop these site-specific, risk-based soil cleanup goals and the potential receptors to soils via incidental ingestion, dermal contact, and inhalation exposure pathways are described in this section. Risk-based soil cleanup goals were quantified for the chemicals retained as COPCs based on comparisons to Resident Soil RSLs and representative background concentrations (see Sections 2.1.2 and 2.1.3), and are provided in Appendix C, Tables C-1 through C-6.

These soil cleanup goals form the basis for development of soil corrective measures objectives (CMOs). Risk-based soil cleanup goals for the SWMUs/AOCs at the Evendale Site are focused on the protection of human receptors, currently and in the reasonably anticipated future, from direct contact exposure to soil, and do not incorporate consideration of potential groundwater impacts to human health, which is addressed by the groundwater CMOs. The groundwater CMOs, as described in the Corrective Measures Study Report – Groundwater Corrective Measure Objectives (OBG, 2017a), are protective of potential groundwater receptors at the Facility as well as beyond the Facility boundary, and are focused on chlorinated volatile organic compounds (CVOCs), the chemical class of concern for groundwater at the Facility. CMOs for groundwater at the Evendale facility incorporate the concept that on-site groundwater use will be restricted.

The development of soil cleanup goals considers the relationships between land use patterns, chemical source areas, and human exposure pathways. A human health CSM is typically used to describe the linkages between possible sources of COPCs and potentially exposed human receptors. Specifically, the CSM identifies the potential



sources of COPCs, current and future human receptors, and potentially complete exposure pathways. Elements of the CSM are discussed in the following sub-sections, and are used to support the development of risk-based soil cleanup goals. The human health CSM for the Facility is presented in Figure 4.

2.2.1 Current and Reasonably Anticipated Future Land Use

The Facility is located within a heavily industrialized corridor that supports a variety of heavy and general industrial and commercial operations, including chemical manufacturing, commercial product development, trucking, and drum recycling. GE began operating the Facility in 1948 and currently performs aircraft engine testing and manufacturing. Given the operational history and location of the Facility and the ongoing expansion of product operations, the current use of the site as an industrial facility is likely to continue in the foreseeable future.

2.2.2 Current and Future Potential Receptors

Current and reasonably anticipated future potential receptors are identified based on current land use practices and best professional judgment regarding future use. Given the industrialized nature of the Facility currently and into the foreseeable future, it may be assumed that on-site workers could potentially be exposed to Facility-related COPCs in soil. Workers with a potential to incur on-site soil exposure given the site setting and land uses include: 1) general industrial workers who perform the majority of their work activities outdoors, 2) office or general industrial workers whose activities are largely conducted indoors, 3) construction workers that work in excavations and/or are associated with construction of roads, buildings, or other structures associated with facility expansion, and 4) utility workers that perform general servicing, maintenance, or repair of underground utility lines. It is also possible that trespassers may, on occasion, gain illegal access to the facility grounds.

The following potential receptors have been identified:

- Outdoor industrial workers
- Indoor industrial workers
- Construction workers
- Utility workers
- Adolescent trespassers (12 <18 years old)
- Adult trespassers (18+ years old).

Note that the development of numeric cleanup goals for the COPCs at each SWMU/AOC assumes that all the receptor populations identified above are or will be exposed in the foreseeable future. This is a conservative measure to guide the CMS. However, it is likely that only a subset of these receptor populations potentially could be exposed to soil in a given SWMU/AOC. Accordingly, it is likely that the risk-based soil cleanup goals at some of the SWMUs and AOCs are overly protective for the receptors evaluated.

The development of numerical cleanup goals for soil is grounded in the assumption that probable future use of the Site remains industrial. If future use of the Site incorporates non-industrial applications, modifications to the cleanup goals will be necessary.

2.2.3 Exposure Routes

Relevant soil exposure routes for the identified potential receptors at this Facility include incidental ingestion, dermal contact, inhalation of fugitive (soil) dust emissions, and inhalation of volatile emissions from soil. Based on the results of soil vapor pathway analysis (OBG, 2017b) indicating that the soil vapor to onsite commercial/industrial pathway is incomplete, the development of risk-based soil cleanup goals does not consider potential vapor emissions from soil into the indoor spaces of worker-occupied buildings. The vapor pathway is being evaluated separately and is not further discussed in this report.



2.2.4 Risk-Based Cleanup Goal Calculations

In the exposure assessment phase of the baseline human health risk assessment process, reasonable maximum exposure (RME) estimates are developed for both current and reasonably anticipated future land use scenarios. Potential receptors are identified, the magnitude and durations of potential exposures are estimated, and the exposure pathways are identified. The RME estimates are developed by calculating the estimated intake of each COPC using medium-specific analytical data and conservative assumptions regarding potential exposure for each retained exposure pathway. The equations used to develop estimated potential COPC receptor doses (for the ingestion and dermal contact pathways) and the exposure concentrations (for the inhalation pathway) are well-documented in USEPA risk assessment guidance (USEPA 1989; 2004; 2009b). Once exposure doses/concentrations are calculated, they are then coupled with toxicity values that are protective of human health to derive site-specific numerical estimates of carcinogenic risk and non-carcinogenic hazard.

The equations used to quantify human exposures and risks can be re-arranged to back-calculate soil concentrations that are protective of potential site-specific human receptors (i.e., soil cleanup goals). This concept is the same as that used by the USEPA in its development of RSLs, the technical approach for which is presented in detail in the *RSL User's Guide* (USEPA, 2016). Parameters used in the development of the risk-based cleanup goals for Facility soils can be broken out by receptor-specific parameters, air emission rates, chemical-specific parameters, and target hazard and risk levels. These parameters are summarized below. Additional detail regarding these parameters is provided in Appendix C.

Receptor-Specific Exposure Parameters

Receptor-specific exposure parameters are evaluated based on available information on potential receptor characteristics and behaviors, as well as on best professional judgment. Parameters include soil ingestion rate, exposure frequency, exposure duration, exposure time, skin surface area, soil adherence factor, and body weight. Values applied for the developing risk-based soil cleanup levels at the Facility are derived primarily from USEPA technical risk assessment guidance (USEPA, 2002; 2004; 2014). Exposure parameter values for developing risk-based soil cleanup levels for each potential receptor at the Facility are presented in Appendix C, Tables C-7 through C-12.

Air Emission Rates

A description of the soil particulate and ambient vapor emission rates used to develop risk-based soil cleanup levels is provided in Appendix C.

Chemical-Specific Exposure Parameters

Chemical-specific factors used to develop risk-based soil cleanup levels include dermal absorption factor and gastrointestinal absorption factor. These factors are presented in Appendix C, Tables C-7 through C-12.

Target Hazard and Risk Levels

Valuation of chemical-specific exposure parameters is based largely on available peer-reviewed toxicity data for COPCs. Toxicity values typically employed to calculate non-carcinogenic hazards include reference doses (RfDs) for oral and dermal exposures and reference concentrations (RfCs) for inhalation exposures. Oral cancer slope factors (CSFs) and inhalation unit risks (IURs) are typically used to estimate carcinogenic risks. Target screening levels for potential receptors are based on a human health cumulative excess lifetime carcinogenic risk goal of 1 \times 10-5; this target risk falls within the acceptable range of cumulative excess lifetime cancer risks of 1 \times 10-4 to 1 \times 10-6 for site-related exposures, as specified in the National Contingency Plan (NCP). For non-carcinogens, the target cumulative hazard index was set equal to 1. Target risk and hazard level factors are presented in Appendix C, Tables C-7 through C-12.

RSLs for the six TPH fractions, as discussed in Section 2.1.1, are based on available reference doses (RfDs) and reference concentrations (RfCs), which are used to evaluate non-carcinogenic effects from ingestion, dermal, and



inhalation exposure pathways. Because the RSLs are derived from non-cancer values and do not incorporate carcinogenicity information, there is some uncertainty associated with the derivation of soil cleanup goals for TPH given that TPH is a mixture of compounds, some of which may have carcinogenic properties. To mitigate this uncertainty, analytical data for benzene from the RFI were compiled for the SWMUs/AOCs where TPH was identified as a COPC. The data indicate that benzene was, in most cases, not detected or was detected below its corresponding Resident Soil RSL (Table 2). There is some uncertainty associated with the benzene assessment given that the detection limits for 15 of the 53 total samples in which benzene was not detected were above the Resident Soil RSL. However, based on this evaluation, there is no compelling evidence that benzene is a significant portion of the TPH in the SWMUs/AOCs. Therefore, application of the most stringent RfD and RfC from the six TPH fractions (aromatic-medium) was deemed to be a sufficiently conservative approach to the derivation of risk-based soil cleanup goals for TPH.

Risk-Based Soil Cleanup Goal Equation

Risk-based soil cleanup goals were calculated for the selected potential receptors according to the methodologies described in Section 2.2. Cleanup levels were developed for the individual chemicals identified as COPCs in soil. The total risk-based soil standard (SS_{tot}), which takes into account the potential exposure routes (ingestion, dermal contact, and inhalation), is calculated consistent with the technical approach for RSL development (USEPA, 2016), as follows:

$$SS_{tot} = \frac{1}{\frac{1}{SS_{ingestion}} + \frac{1}{SS_{dermal}} + \frac{1}{SS_{inhalation}}}$$

where:

 SS_{tot} = total risk-based soil standard (potentially applicable exposure routes) $SS_{ingestion}$ = risk-based soil standard based on ingestion exposure route SS_{dermal} = risk-based soil standard based on dermal contact exposure route $SS_{inhalation}$ = risk-based soil standard based on inhalation exposure route

Calculations of soil cleanup goals for the Facility COPCs in soils are presented in Appendix C, Tables C-1 through C-6 for outdoor industrial workers, indoor industrial workers, construction workers, utility workers, older child trespassers, and adult trespassers, respectively. Note that for each COPC, the lower (more conservative) of the two values for carcinogenic and non-carcinogenic endpoints is selected as the cleanup goal. A summary table of the soil cleanup goals for each potential receptor is presented in Table 3.

Lead

As discussed in Section 2.1.3, lead was identified as a COPC based on a single sample concentration in SWMU 29 soils above the Resident Soil RSL. Because most lead-based human health effects data are based on blood-lead concentrations instead of external dose, the traditional reference dose approach to toxic chemicals is not applicable for quantifying exposure and risk to lead. Consequently, health impacts associated with potential lead exposure are often assessed using blood-lead concentration either directly measured or modeled using USEPA blood-lead models (e.g., IEUBK). Consequently, a site-specific soil cleanup goal was not calculated for lead. The Industrial Soil RSL for lead (800 mg/kg), which was derived based on blood-lead concentration effects data, is proposed as the soil cleanup goal for this metal.

2.3 APPLICATION TO INSTITUTIONAL AND ENGINEERING CONTROLS

Surface and subsurface (<12 feet depth) soil data were compared to current Resident Soil RSLs and background soil concentrations of metals for the 49 Facility SWMUs and AOCs retained from the RFI for additional evaluation. Results are summarized in Table 1 and Figure 2. Results of this screening assessment include:



- Nine SWMU/AOCs were eliminated from further evaluation due to soil concentrations below Resident Soil USEPA RSLs or background, with a total of 40 SWMUs/AOCs retained for further action (Table 1). SWMU 118 was eliminated for reasons discussed in Section 2.1.1.
- Within the 40 SWMUs/AOCs retained for further action, there were a total of 18 COPCs identified in soil, including metals (arsenic, cadmium, cobalt, copper, lead, manganese, and vanadium), cyanide, PAHs (benzo[a] anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3-cd]pyrene, and naphthalene), PCBs, VOCs (TCE, vinyl chloride), and TPH (Table 1)

Using exposure dose methodologies adapted from the USEPA RSL User's Guide (USEPA, 2016) and the latest USEPA-approved chemical toxicity data, risk-based soil cleanup goals were calculated for each COPC for these potential receptors (site workers, construction workers, utility workers, and trespassers) (Table 3). These soil cleanup goals formed the basis for the development of soil CMOs. For the reasons described in Section 2.2.4, a site-specific numeric soil cleanup goal was not established for lead; the Industrial Soil RSL is proposed as the soil cleanup goal for lead.

This report, along with the *Corrective Measures Study Report – Institutional and Engineering Controls Plan* (I&EC Plan) (OBG, 2017c), provides the framework for the development of Facility-wide institutional and engineering controls to support a soil risk management program. The screening of SWMUs/AOCs and approach to the application of institutional and engineering controls are summarized in Table 4 and Figure 5. SWMUs/AOCs that have been identified for no further action (NFA) and SWMUs/AOCs that are planned to be managed under institutional and engineering controls are categorized as follows (Table 4):

- **Group C** SWMUs/AOCs with COPCs soil concentrations *at or below the Resident Soil RSLs* are recommended for no further action, other than site-wide restrictions on groundwater use. SWMUs/AOCs with metals (e.g., arsenic) concentrations at or below background values in soil are also recommended for no further action. [Note: there is no reported use of arsenic-containing compounds in site manufacturing]
- Group A SWMUs/AOCs with COPC soil concentrations above the Resident Soil RSLs and at or below the CMOs are recommended for continued nonresidential usage, site-wide restrictions on groundwater use, and controlled management of soil disturbance during utilities maintenance or construction under the I&EC Plan (OBG, 2017c).
- **Group B** SWMUs/AOCs with COPC soil concentrations *greater than CMOs* are recommended for the same measures, plus cover systems comprised of pavement, concrete, clean fill, or overlying structures. Requirements for a cover system will be formalized in an environmental covenant to restrict future site activities within these impacted areas.

Those SWMUs/AOCs included in Groups A and B are summarized in Table 5, including maximum COPC soil concentrations, screening levels, and CMOs derived from the risk-based soil cleanup goals. SWMUs/AOCs identified in Groups A and B are addressed in further detail in the I&EC Plan (OBG, 2017c).



3. SUMMARY AND CONCLUSIONS

The following summary highlights the results from the soil pathway analysis at the GE Evendale Facility:

- Initial SWMU/AOC Screening Soil concentrations from the 49 SWMU/AOCs retained for further evaluation during the CMS were reviewed and compared with current USEPA Resident Soil RSLs and local background soil concentrations of metals, consistent with current and reasonably anticipated future land use at the Facility. Based on this screening, 9 SWMUs/AOCs were eliminated from further evaluation due to soil concentrations below RSLs or background, with a total of 40 SWMUs/AOCs retained for further evaluation.
- Identification of COPCs A comparison of SWMU/AOC RFI soil data with USEPA Resident Soil RSLs and local background soil concentrations of metals for each SWMU/AOC indicated a total of 18 COPCs with concentrations above screening levels or background concentrations, including metals, cyanide, PAHs, PCBs, VOCs, and TPH.
- CSM Development A human health CSM was developed to identify the relationship between chemical sources and the current and future potential receptors. The CSM was used to assist in identifying potentially complete exposure pathways under current and reasonably anticipated future industrial/commercial land use.
- Soil Cleanup Goals Potential receptors evaluated to support the development of soil cleanup goals included indoor/outdoor industrial workers, construction workers, utility workers and adult/adolescent trespassers. Relevant soil exposure routes for these potential receptors include incidental ingestion, dermal contact, and inhalation of soil dust and ambient vapors. Using exposure dose/concentration and toxicity data, risk-based soil cleanup goals were calculated for each COPC for these potential receptors. Values for soil cleanup goals were lowest (most conservative) for the outdoor industrial worker or construction worker given the higher intensity of potential soil exposure by these potential receptors. Calculated soil cleanup goals are shown in Table 3. The CMS will evaluate the soil cleanup goals considered to be applicable for the Facility.

Potential vapor emissions from soil into worker-occupied buildings is not included in the development of soil cleanup goals, based on the results of recent soil vapor pathway analysis presented separately in the *Corrective Measures Study Report – Soil Vapor* (OBG, 2017b).

The calculated risk-based soil cleanup goals are based on industrial use of the property currently and in the foreseeable future. Changes in Site use to incorporate non-industrial applications would require modifications to these cleanup goals.

Institutional and Engineering Controls – This report is an accompaniment to the CMS Report and, along with the Corrective Measures Study Report – Institutional and Engineering Controls Plan (OBG, 2017c) and associated Facility soil management procedures, provides the framework for the development of Facility-wide institutional and engineering controls to support a soil risk management program. Appropriate controls are more fully developed in the evaluation and selection of corrective action alternatives as part of the CMS.



4. REFERENCES

- Cox-Colvin & Associates, Inc. 1996. Evaluation of Background Metal Concentrations in Ohio Soils. Report submitted to Ohio Environmental Protection Agency. June 21, 1996.
- Earth Tech, Inc. 2000. Summary of IRP Investigations and Recommendations for Closure for Each IRP Site and Area of Concern at Former Air Force Plant 36. Prepared for the Air Force Center for Environmental Excellence and Aeronautical Systems Center, September 2000.
- O'Brien & Gere (OBG). 1995. RCRA Facility Investigation Report, GE Aircraft Engines, Evendale Ohio. December 1994; revised September 1995.
- OBG. 2014. Corrective Measures Study Work Plan. GE Aviation, Evendale, Ohio. May 2014.
- OBG, 2017a. Corrective Measures Study Interim Report Groundwater Corrective Measure Objectives. GE Aviation, Evendale, Ohio. February 2017.
- OBG, 2017b. Corrective Measures Study Interim Report Soil Vapor. GE Aviation, Evendale, Ohio. February 2017.
- OBG, 2017c. Corrective Measures Study Interim Report Institutional and Engineering Controls Plan. GE Aviation, Evendale, Ohio. February 2017.
- Ohio Environmental Protection Agency (Ohio EPA). 2015. Evaluation of Background Metal Soil Concentrations in Hamilton County Cincinnati Area, Summary Report. May 2015.
- Shacklette, H.T., and J.G. Boerngen. 1984. Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States. U.S. Geological Survey Professional Paper 1270.
- U.S. Environmental Protection Agency (USEPA). 1989. Risk Assessment Guidance for Superfund, Vol. 1: Human Health Evaluation Manual. Interim Final Report. Office of Emergency and Remedial Response. EPA 540/1-89/002. December 1989.
- USEPA. 1994. RCRA Corrective Action Plan (Final). OSWER Directive 9902.3-2A, May 1994.
- USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. Office of Solid Waste and Emergency Response. OSWER 9355.4-24. December 2002.
- USEPA. 2004. Risk Assessment Guidance for Superfund (RAGS), Vol. 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. Office of Superfund Remediation and Technology Innovation. EPA/540/R-99/005. OSWER Directive 9285.7-02EP. July 2004.
- USEPA. 2009a. Provisional Peer-Reviewed Toxicity Values for Complex Mixtures of Aliphatic and Aromatic Hydrocarbons (CASRN Various). Superfund Health Risk Technical Support Center, National Center for Environmental Assessment, Office of Research and Development. September 30, 2009.
- USEPA. 2009b. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment). Final. EPA-540-R-070-002. OSWER 9285.7-82. Office of Superfund Remediation and Technology Innovation, Washington, DC. January 2009.
- USEPA. 2011. *Exposure Factors Handbook: 2011 Edition*. EPA/600/R-090/052F. Office of Research and Development. Washington, D.C. September 2011.
- USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. Office of Solid Waste and Emergency Response. February 6, 2014.
- USEPA. 2016. Regional Screening Table User's Guide (May 2016). https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide-may-2016





Table 1 Screening Evaluation Summary for SWMUs/AOCs GE Aviation - Evendale, Ohio

		RFI		
SWMU Number	Unit Name	Results Above Resident Soil RSLs ¹	Retained Metals Above Background ²	Recommended Further Action ³
8/12	Temporary Drum Storage Area (Former Bldg. 509)/Drum Crusher Unit	TCE, VC, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, indeno[1,2,3-cd]pyrene, TPH, PCBs, As, Co	Co	CMS
14	Battery Storage Area	As, Cd, CN, Co	Cd, Co	CMS
16	Weigh Station Sump	TPH, As	As	CMS
17	Reading Road Landfill	TPH, As, Co	As, Co	CMS
18	Sludge Basin Landfill	Naphthalene, TPH, As	As	CMS
19	East Landfarm	As, Mn	Mn	CMS
20	Former North Landfarm	Benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, indeno[1,2,3- cd]pyrene, As, Mn, TPH	Mn	CMS
21/22	Former 508 Sludge Basin	TCE, VC, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3- cd]pyrene, TPH, PCBs, As, Cd, Co, Cu, Ni, Sb, CN	Ni ⁴ , Sb ⁴ , Cd, Co, Cu	CMS
27/28	Former Lime Precipitate Basins 1 and 2	As	As	CMS
29	Lime Precipitate Basin 3	TPH, As, Mn, V	Mn, V	CMS
31	Lime Precipitate Basin 5	TPH, As	None	CMS
42	Former Chip Loading Area		NA	NFA
61/67	Underground Waste Oil/Fuel Storage Tank 304-7		NA	NFA
79	Former Bldg. 800 Wastewater Pretreatment System	As, Cd, Co	Cd, Co	CMS
86	Oil/Water Separator 301-2	As	None	NFA
87/88	Oil/Water Separators 303-1 and 303-3	TPH, PCBs, As	None	CMS
93/94	Oil/Water Separator 500-1E and 500-1W	TPH, As	None	CMS
95	Oil/Water Separator 500-2	As	None	NFA
98/99	Oil/Water Separators 703-1E and 703-1W	TPH, As	None	CMS
100	Oil/Water Separator 707-1	As	None	NFA
118	Process Sewer System - Sanitary Sewer	PCBs	NA	NFA
122	Stormwater Pumphouse 422	As	None	NFA
123	Stormwater Pumphouse 423	As	None	NFA
124	Stormwater Pumphouse 506	TPH, As	As	CMS
141	Gravel Media Coalescing Separator	ТРН	NA	CMS
142	Bldg. 800 Machine Sump (Added 1/16/91)	TPH, As, Co	Со	CMS
AOC A	Bldg. P Fuel Spill	ТРН	NA	CMS
AOCs D and I	Bldg. B Fuel Spills No. 1 and No. 2	ТРН	NA	CMS
AOC L	Bldg. 304 Fuel Spill	Naphthalene, TPH	NA	CMS
AOC W2/SWMUs 62/63	Inactive Underground Product Storage Tanks 417-E M-1; Underground Waste Oil/Fuel Storage Tanks 417-2 and 417-3	TPH	NA	CMS
AOC W3/SWMUs 64/68	Inactive Underground Product Storage Tanks 515-1 to 27; Underground Waste Oil/Fuel Storage Tank 505-28	TPH	NA	CMS
AOC W4/SWMU 65	Inactive Underground Product Storage Tanks 507-5,6,13,14; Underground Waste Oil/Fuel Storage Tank 507-4	ТРН	NA	CMS
AOC W10/SWMU 72	Inactive Underground Product Storage Tanks D-1 to 5; Waste Fuel Collection Tank D-1	ТРН	NA	CMS
AOC LD	Bldg. 700 South Loading Dock	TCE	NA	CMS
AOC PST	TCE/TCA Product Storage Tanks	TCE	NA	CMS

Notes

RSL - Regional Screening Level

(1) Analytical results were compared to USEPA Resident Soil RSLs (May 2016). SWMUs/AOCs shaded in green contain chemicals whose maximum concentrations are below Resident Soil RSLs or have concentrations that are consistent with background levels. See text discussion regarding SWMU 118.

(2) None = Concentrations are below background

(3) CMS - Indicates SWMU/AOC will be evaluated further in Corrective Measures Study; NFA - indicates no further action

(4) This metal was detected above its Resident Soil RSL and background level, but only at depths beyond those typically available for direct contact by human receptors.

NA - Not Applicable

Table 2 Benzene Data Summary for SWMUs/AOCs Where TPH Is Identified as a COPC GE Aviation Evendale Facility Evendale, Ohio

SWMU Number	Unit Name	Benzene Analyzed in Samples? ¹	Benzene Detected? ¹	Detection Frequency ¹	Detected Concentration(s) ¹ mg/kg	Notes ²
8/12	Temporary Drum Storage Area (Former Bldg. 509) / Drum Crusher Unit	Υ	Υ	1/11	0.073	Detection below benzene RSL; five benzene samples have elevated DLs (above RSL)
16	Weigh Station Sump	Y	N	0/2		
18	Sludge Basin Landfill	N				Benzene data unavailable
21/22	Former 508 Sludge Basin	Υ	N	0/4		Two benzene samples have elevated DLs (above RSL)
29	Lime Precipitate Basin 3	Y	N	0/1		
31	Lime Precipitate Basin 5	Υ	N	0/2		
87/88	Oil/Water Separators303-1 and 303-3	N				Benzene data unavailable
93/94	Oil/Water Separators 500-1E and 500-1W	Υ	Υ	2/2	0.048 / 0.16	Both detections below benzene RSL
98/99	Oil/Water Separators 703-1E and 703-1W	N				Benzene data unavailable
124	Stormwater Pumphouse 506	Υ	N	0/1		
141	Gravel Media Coalescing Separator	N				Benzene data unavailable
142	Bldg. 800 Machine Sump	Υ	N	0/3		
AOC A	Bldg. P Fuel Spill	N				Benzene data unavailable
AOCs D and I	Bldg. B Fuel Spills No. 1 and 2	Υ	N	0/2		
AOC L	Bldg. 304 Fuel Spill	Υ	N	0/2		
$11\Delta\Omega C M/2 / SM/MHz 62/63$	Inactive Underground Product Storage Tanks 417-E M-1; Underground Waste Oil/Fuel Storage Tanks 417-2 and 417-3515-1 to 27	Y	N	0/3		Benzene not detected; samples have elevated DLs (above RSL)
AOC W3 / SWMUs 64/68	Inactive Underground Product Storage Tanks 515-1 to 27	Y	N	0/9		Benzene not detected; three samples have elevated DLs (above RSL)
AOC W4 / SWMU 65	Inactive Underground Product Storage Tanks 507-5,6,13,14	Y	Υ	1/6	n nna	Detection below benzene RSL; other samples have elevated DLs (above RSL)
AOC W10 / SWMU 72	Inactive Underground Product Storage Tanks D-1 to 5	Υ	N	0/9	-	

Notes

DL - detection limit

 $^{^{1}\!\}text{Applies}$ to samples where TPH was detected above the Resident Soil RSL.

²Benzene Resident Soil RSL = 1.2 mg/kg.

TABLE 3 CALCULATED RISK-BASED SOIL CLEANUP GOALS FOR CONSTITUENTS OF POTENTIAL CONCERN GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

	Receptor										
Constituent of Potential Concern	Outdoor Industrial Worker	Indoor Industrial Worker	Utility Worker	Construction Worker	Older Child Trespasser	Adult Trespasser	Lowest Soil RG				
INORGANICS											
Arsenic	21.5	43.5	188	202	188	62.0	21.5				
Cadmium	1242	2142	11640	727	2616	3661	727				
Cobalt	381	670	3569	220	791	1111	220				
Copper	51911	93440	486667	29495	106318	149744	29495				
Cyanide	778	1401	7297	442	1595	2246	442				
Lead				see note 1							
Manganese	25590	39088	239903	16604	59225	81046	16604				
Vanadium	6345	11174	59488	3662	13184	18509	3662				
POLYCYCLIC AROMATIC HYDROCARBO	ONS										
Benzo(a)anthracene	32.3	89.6	245	501	295	92.7	32.3				
Benzo(a)pyrene	3.23	9.0	24.5	50.1	29.5	9.3	3.23				
Benzo(b)fluoranthene	32.3	89.6	245	501	295	92.7	32.3				
Dibenz(a,h)anthracene	3.23	9.0	24.5	50.1	29.5	9.3	3.23				
Indeno(1,2,3-cd)pyrene	32.3	89.6	245	501	295	92.7	32.3				
Naphthalene	1423	1280	13337	1639	16513	8207	1280				
TOTAL PETROLEUM HYDROCARBONS											
Total Petroleum Hydrocarbons	2743	3355	25716	1255	8074	10354	1255				
POLYCHLORINATED BIPHENYLS											
PCBs (total)	11.5	32.7	86.4	179	105	32.9	11.5				
VOLATILE ORGANIC COMPOUNDS											
Trichloroethene	113	111	1056	44.9	494	554	44.9				
Vinyl chloride	35.9	50.1	337	444	376	121	35.9				

Notes:

Units are in mg/kg.

RG - Soil cleanup goal

^{1.} Soil cleanup goal not estabished for lead. The Industrial Soil RSL (800 mg/kg) is proposed as the cleanup goal for lead.

Table 4 Summary of SWMUs/AOCs Identified for No Further Action and SWMU Management Controls GE Aviation - Evendale, Ohio

		RFI				
SWMU Number	Unit Name	Results Above Resident Soil RSLs ¹	Retained Metals Above Background ²	Recommended Further Action ³	Cover Materials	Action Category
8/12	Temporary Drum Storage Area (Former Bldg. 509)/Drum Crusher Unit	TCE, VC, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, indeno[1,2,3-cd]pyrene, TPH, PCBs, As, Co	Co	CMS	Covered with concrete	В
14	Battery Storage Area	As, Cd, CN, Co	Cd, Co	CMS	Covered with asphalt	А
16	Weigh Station Sump	TPH, As	As	CMS	Covered with concrete	В
17	Reading Road Landfill	TPH, As, Co	As, Co	CMS	Covered with vegetation	А
18	Sludge Basin Landfill	Naphthalene, TPH, As	As	CMS	Covered with vegetation	В
19	East Landfarm	As, Mn	Mn	CMS	Covered with vegetation	А
20	Former North Landfarm	Benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, indeno[1,2,3- cd]pyrene, As, Mn, TPH	Mn	CMS	Covered with vegetation	А
21/22	Former 508 Sludge Basin	TCE, VC, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, indeno[1,2,3- cd]pyrene, TPH, PCBs, As, Cd, Co, Cu, Ni, Sb, CN	Ni ⁴ , Sb ⁴ , Cd, Co, Cu	CMS	Small portion covered with concrete, remainder covered with gravel	В
27/28	Former Lime Precipitate Basins 1 and 2	As	As	CMS	Covered with vegetation	А
29	Lime Precipitate Basin 3	TPH, As, Mn, V	Mn, V	CMS	Covered with vegetation	А
31	Lime Precipitate Basin 5	TPH, As	None	CMS	Covered with vegetation	А
42	Former Chip Loading Area		NA	NFA	Covered with gravel	С
61/67	Underground Waste Oil/Fuel Storage Tank 304-7		NA	NFA	Covered with concrete	С
79	Former Bldg. 800 Wastewater Pretreatment System	As, Cd, Co	Cd, Co	CMS	Covered by Bldg 800	А
86	Oil/Water Separator 301-2	As	None	NFA	Covered with concrete	С
87/88	Oil/Water Separators 303-1 and 303-3	TPH, PCBs, As	None	CMS	Covered with concrete	А
93/94	Oil/Water Separator 500-1E and 500-1W	TPH, As	None	CMS	Covered by building & concrete	А
95	Oil/Water Separator 500-2	As	None	NFA	Covered with concrete	С
98/99	Oil/Water Separators 703-1E and 703-1W	TPH, As	None	CMS	Covered with concrete	А
100	Oil/Water Separator 707-1	As	None	NFA	Covered by building & concrete	С
118	Process Sewer System - Sanitary Sewer	PCBs	NA	NFA	Sitewide	С
122	Stormwater Pumphouse 422	As	None	NFA	Covered by Building	С
123	Stormwater Pumphouse 423	As	None	NFA	Covered by building & concrete	С
124	Stormwater Pumphouse 506	TPH, As	As	CMS	Covered by Building	А
141	Gravel Media Coalescing Separator	TPH	NA	CMS	Covered with concrete	В
142	Bldg. 800 Machine Sump (Added 1/16/91)	TPH, As, Co	Co	CMS	Covered by Bldg 800	В
AOC A	Bldg. P Fuel Spill	ТРН	NA	CMS	Primarily covered with concrete	А
AOCs D and I	Bldg. B Fuel Spills No. 1 and No. 2	TPH	NA	CMS	Covered with concrete	В
AOC L	Bldg. 304 Fuel Spill	Naphthalene, TPH	NA	CMS	Covered with concrete	В
AOC W2/SWMUs 62/63	Inactive Underground Product Storage Tanks 417-E M-1; Underground Waste Oil/Fuel Storage Tanks 417-2 and 417-3	ТРН	NA	CMS	Covered with concrete	А
AOC W3/SWMUs 64/68	Underground Waste Oil/Fuel Storage Tank 505-28	ТРН	NA	CMS	Covered with concrete	В
AOC W4/SWMU 65	Inactive Underground Product Storage Tanks 507- 5,6,13,14; Underground Waste Oil/Fuel Storage Tank 507- 4	ТРН	NA	CMS	Covered with concrete	В
AOC W10/SWMU 72	Inactive Underground Product Storage Tanks D-1 to 5; Waste Fuel Collection Tank D-1	ТРН	NA	CMS	Former building, currently grass surface	В
AOC LD	Bldg. 700 South Loading Dock	TCE	NA	CMS	Covered by building & concrete	Α
AOC PST	TCE/TCA Product Storage Tanks	TCE	NA	CMS	Covered with concrete and vegetation	Α

Notes:

RSL - Regional Screening Level

(1) Analytical results were compared to USEPA Resident Soil RSLs (May 2016). SWMUs/AOCs shaded in green contain chemicals whose maximum concentrations are below Resident Soil RSLs or have concentrations that are consistent with background levels.

See text discussion regarding SWMU 118.

(2) None = Concentrations are below background
(3) CMS - recommended for further evaluation in the Corrective Measures Study

(4) This metal was detected above its Resident Soil RSL and background level, but only at depths beyond those typically available for direct contact by human receptors.

 $\operatorname{--Indicates}$ no constituent concentration at or above referenced RSL or background level NA - Not Applicable

Planned Remedial Approach

RSLs < Soil Concentrations <CMOs [Institutional Controls]
Soil Concentrations >CMOs [Institutional and Engineering Controls] No Further Action (NFA)

Table 5 Summary of SWMUs/AOCs Identified for SWMU Management Controls and Soil Corrective Measures Objectives (CMOs) GE Aviation - Evendale Ohio

		RFI Result	s	Actio	on Levels	CMS
SWMU Number	Unit Name	COPCs with Results Above Resident Soil RSLs ¹	Maximum Concentration	USEPA Resident Soil RSL ¹	Soil Background Concentration ²	Soil Corrective Measure Objectives (CMOs)
		TCE	22.0	0.91		44.9
		Vinyl chloride	0.59	0.059		35.9
		Benzo[a]anthracene	2.9	0.16		32.3
	Temporary Drum Storage Area (Former Bldg. 509) / Drum	Benzo[a]pyrene Benzo[b]fluoranthene	2.1 4.1	0.016 0.16		3.23 32.3
8/12	Crusher Unit	Indeno[1,2,3-cd]pyrene	1.1	0.16		32.3
		PCBs	390	0.23		11.5
		TPH	18000	see note 3		1255
		As	18.1*	0.68	12.9	21.5
		Co	25.9	23	6.4	220
		Cd	92	71	0.51	727
14	Battery Storage Area	Со	130	23	6.4	220
		CN	80.0	23		442
16	Weigh Station Sump	TPH	4600	see note 3		1255
		As As	23.5 18.0	0.68	12.9 12.9	21.5 21.5
17	Reading Road Landfill	Co	32.0	23	6.4	21.5
1,		ТРН	220	see note 3		1255
		TPH	2700	see note 3		1255
18	Sludge Basin Landfill	Naphthalene	4.7	3.8		1280
		As	17.0	0.68	12.9	21.5
19	East Landfarm	Mn	2800.0	1800	459	16604
		Benzo[a]anthracene	2.9	0.16		32.2
		Benzo[a]pyrene	2.5	0.016		3.23
20	Former North Landfarm	Benzo[b]fluoranthene	4.6	0.16		32.3
		Indeno[1,2,3-cd]pyrene	1.6	0.16		32.3
		TPH	170*	see note 3		1255
		Mn TCE	2900 20*	1800 0.91	12.9	16604 44.9
		Vinyl chloride	0.14*	0.059		35.9
		Benzo[a]anthracene	1.8	0.16		32.3
		Benzo[a]pyrene	0.97	0.016		3.23
		Benzo[b]fluoranthene	3.4	0.16		32.3
		Dibenz[a,h]anthracene	0.37	0.016		3.23
21/22	Former 508 Sludge Basin ⁴	Indeno[1,2,3-cd]pyrene	1.5	0.16		32.3
		PCBs	9.0	0.23		11.5
		TPH	7700	see note 3		1255
		CN	1500*	23		442
		Cd Co	210*	71	0.51	727
		Cu	95* 5100*	23 3100	6.4 11.8	220 29495
27/28	Former Lime Precipitate Basins 1 and 2	As	20.0	0.068	12.9	29495
,20		TPH	170	see note 3		1255
29	Lime Precipitate Basin 3	Mn	2500	1800	459	16604
		V	1570	390	17.4	3662
31	Lime Precipitate Basin 5	TPH	780*	see note 3		1255
79	Former Bldg. 800 Wastewater Treatment Pre-System	Cd	320	71	0.51	727
	-0	Co	38	23	6.4	220
87/88	Oil/Water Separators 303-1 and 303-3	TPH	120	see note 3		1255
93/94	Oil/Water Separators 500-1E and 500-1W	PCBs TPH	1.53 480	0.23 see note 3		11.5 1255
98/99	Oil/Water Separators 703-1E and 500-1W Oil/Water Separators 703-1E and 703-1W	TPH	130	see note 3		1255
		TPH	220	see note 3		1255
124	Stormwater Pumphouse 506	As	18.2*	0.68	12.9	21.5
141	Gravel Media Coalescing Separator	TPH	11796	see note 3		1255
142	Bldg. 800 Machine Sump (Added 1/16/91)	TPH Co	23000 87.4	see note 3 23	 6.4	1255 220
AOC A	Bldg. P Fuel Spill	TPH	83	see note 3		1255
AOCs D and I	Bldg. B Fuel Spills No. 1 and 2	TPH	4327	see note 3		1255
AOC L		Naphthalene	4.7	3.8		1280
AOC W2 / SWMUs	Bldg. 304 Fuel Spill	TPH	3700	see note 3		1255
62/63 AOC W3 / SWMUs	Inactive Underground Product Storage Tanks 417 E M-1 Inactive Underground Product Storage Tanks 515-1 to 27	TPH	290	see note 3		1255
64/68		ТРН	9100	see note 3		1255



Table 5

Summary of SWMUs/AOCs Identified for SWMU Management Controls and Soil Corrective Measures Objectives (CMOs) GE Aviation - Evendale Ohio

		RFI Result	S	Actio	CMS	
SWMU Number	Unit Name	COPCs with Results Above Resident Soil RSLs ¹	Maximum Concentration	USEPA Resident Soil RSL ¹	Soil Background Concentration ²	Soil Corrective Measure Objectives (CMOs)
AOC W4 / SWMU 65	Inactive Underground Product Storage Tanks 507-5,6,13,14	TPH	8000*	see note 3		1255
AOC W10 / SWMU 72	Inactive Underground Product Storage Tanks D-1 to 5	TPH	306	see note 3		1255
AOC LD	Bldg. 700 South Loading Dock	TCE	9.6*	0.91		44.9
AOC PST	TCE/TCA Product Storage Tanks	TCE	14	0.91		44.9

Notes:

RSL - Regional Screening Level

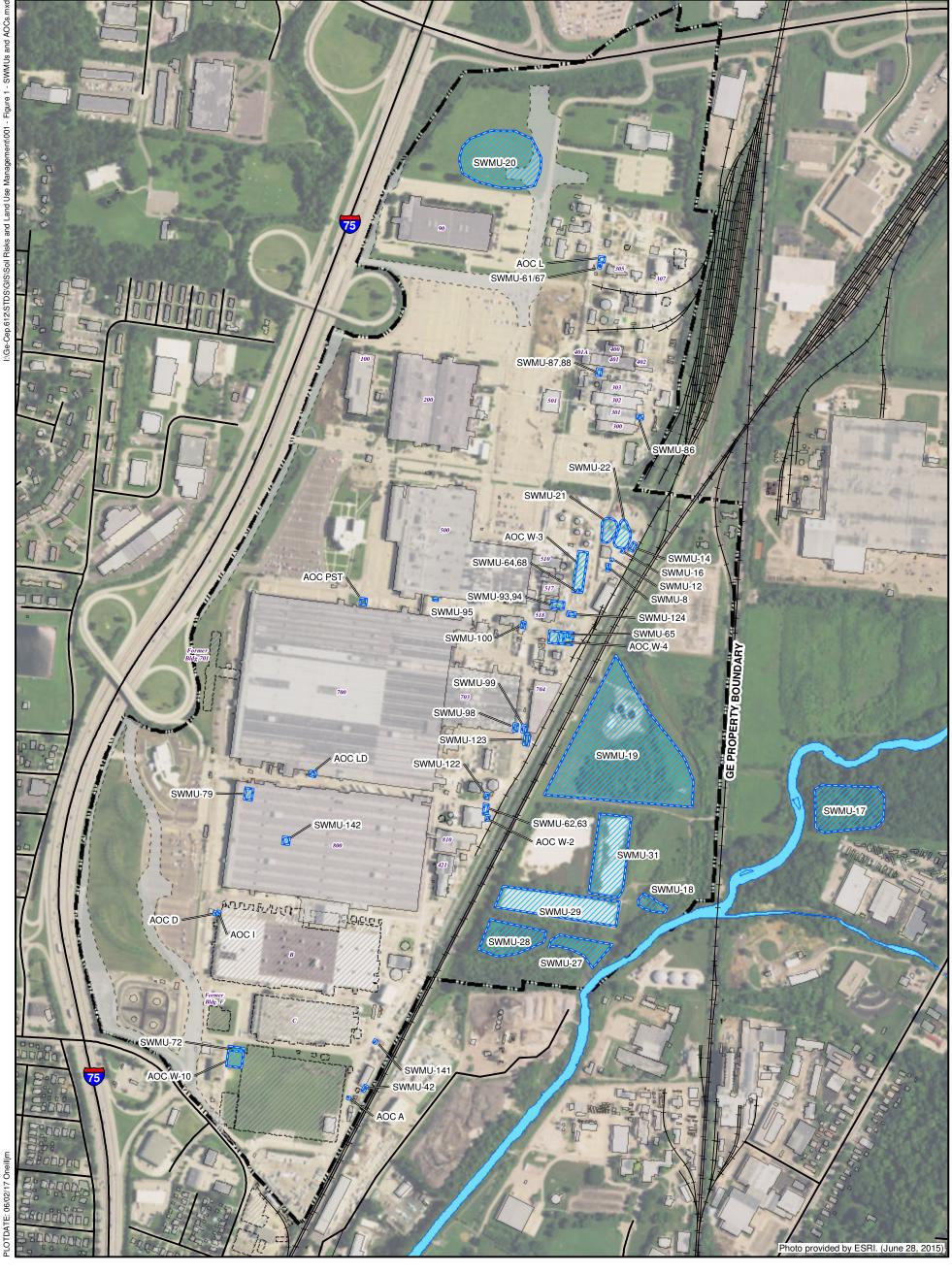
Concentrations in mg/kg

- (1) Analytical results were compared to USEPA Resident Soil RSLs (May 2016).
- (2) Soil background concentrations reported for the Cincinnati area (Ohio EPA, 2015)
- (3) The USEPA Resident Soil RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic-Low), 96 mg/kg for TPH (Aliphatic-Medium), and 2,500 mg/kg for TPH (Aromatic-High).
- (4) Antimony and nickel detected above Resident Soil RSLs and background concentrations in this SWMU, but detections above RSLs only occurred at depths greater than those available for human exposure.



^{*}Sample concentration at depth > 12 feet (assumed to be inaccessible for human exposures)

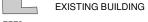




LEGEND



SOLID WASTE MANAGEMENT UNIT (SWMU) or AREA OF CONCERN (AOC)



FORMER BUILDING

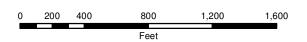
800

BUILDING ID

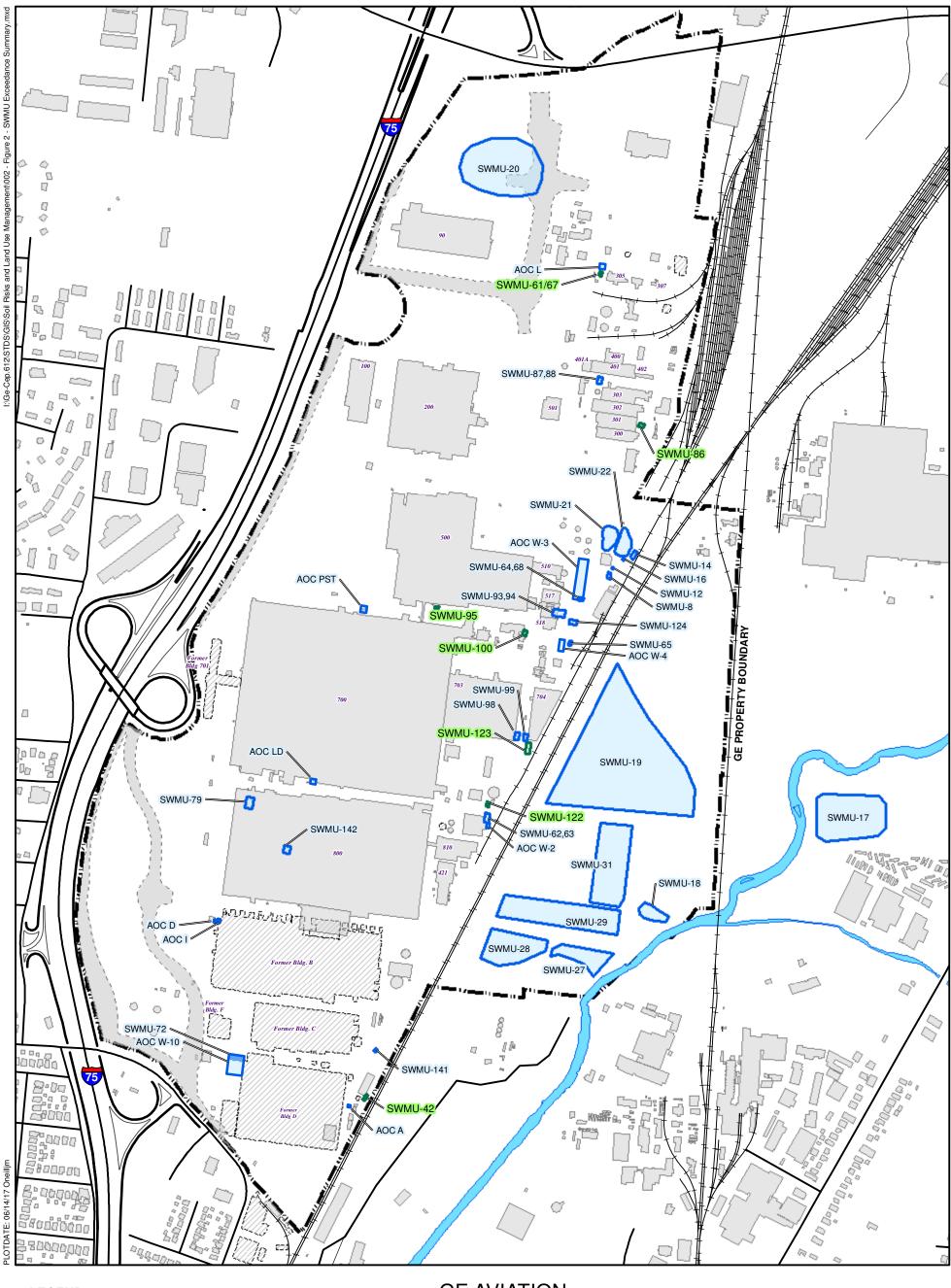
ODOT PLAN - RIGHT OF WAY

GE AVIATION EVENDALE, OHIO

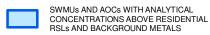
SWMUs AND AOCs RECOMMENDED IN THE RFI FOR FURTHER EVALUATION

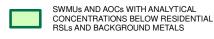






LEGEND







800

FORMER BUILDING

ODOT PLAN - RIGHT OF WAY BUILDING ID

GE AVIATION EVENDALE, OHIO

SWMUs AND AOCs RESULTS OF SCREENING AGAINST RESIDENTIAL RSLs & BACKGROUND METALS

800

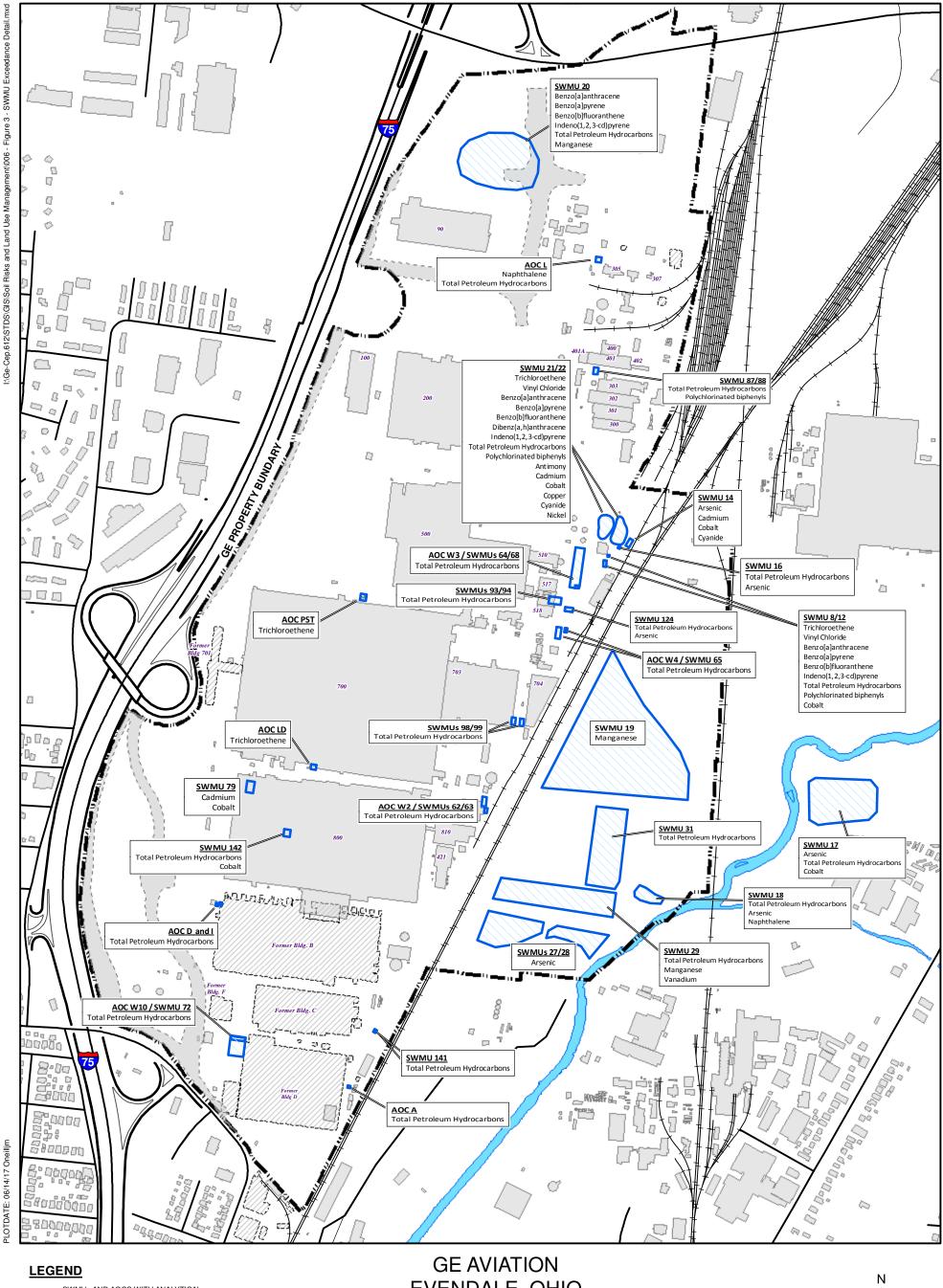
Feet

1,200

1,600

200 400





SWMUs AND AOCS WITH ANALYTICAL CONCENTRATIONS ABOVE RESIDENTIAL RSLs AND BACKGROUND METALS SWMILID **SWMU 17** CONSTITUENT EXISTING BUILDING FORMER BUILDING *800* **BUILDING ID**

ODOT PLAN - RIGHT OF WAY

EVENDALE, OHIO

SWMUs AND AOCs DETAIL OF SOIL ANALYTICAL CONCENTRATIONS ABOVE SCREENING VALUES & BACKGROUND METALS

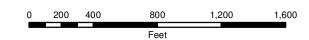
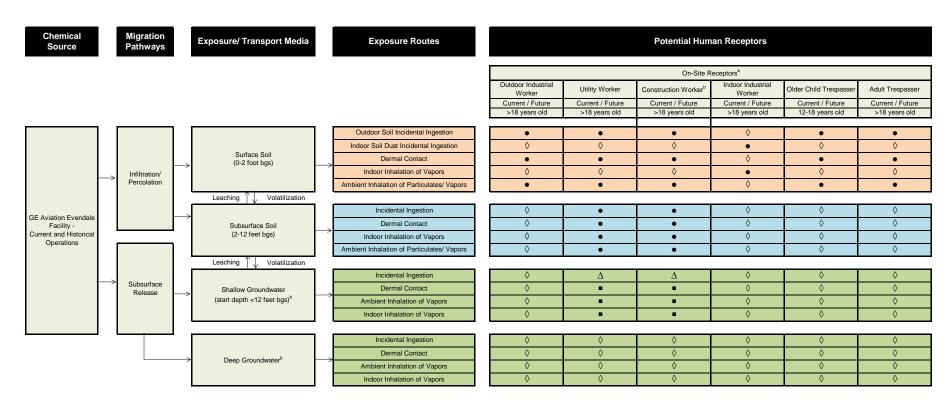


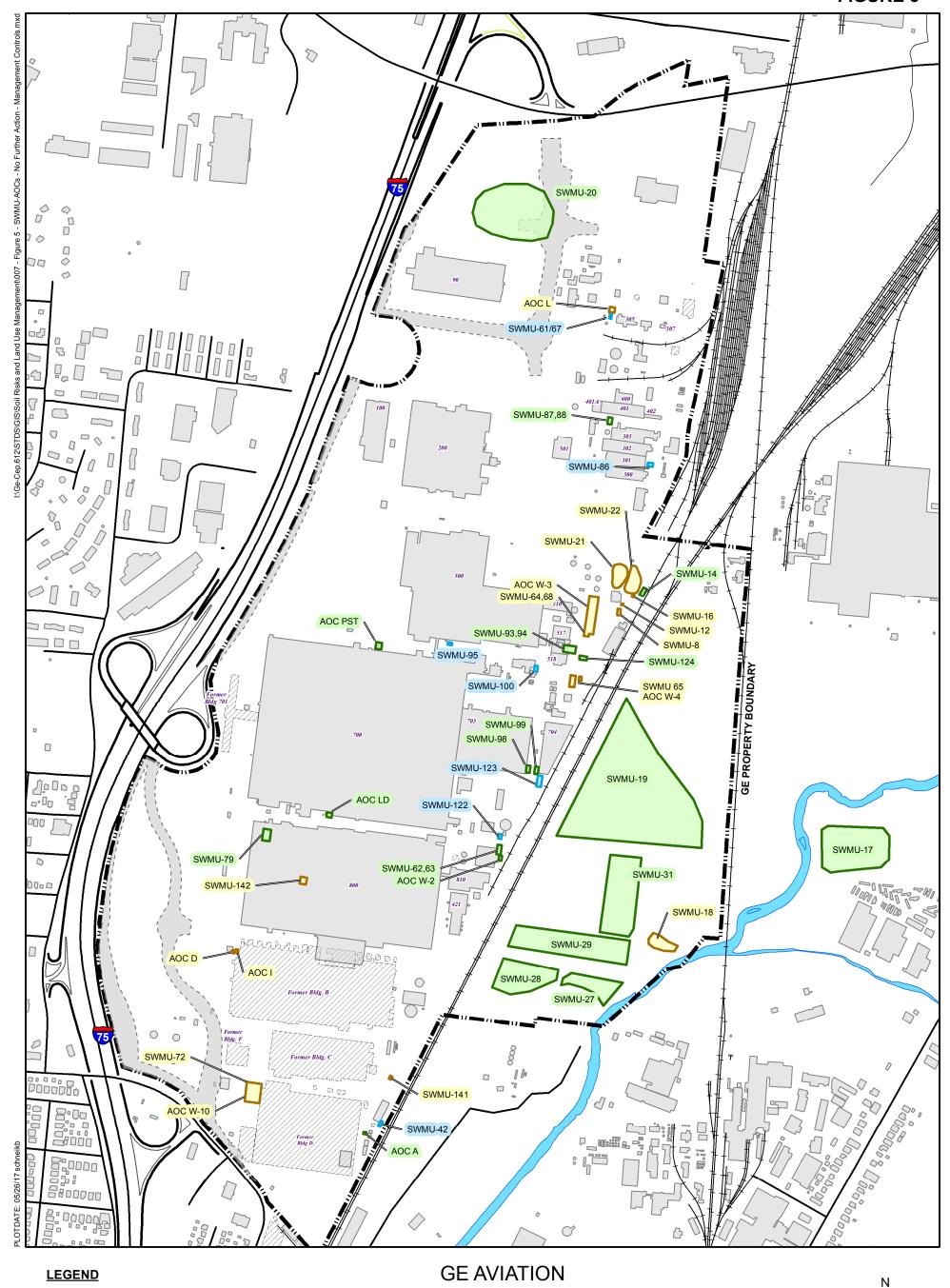


Figure 4 Human Health Conceptual Site Model GE Aviation Evendale Facility Evendale, Ohio



Notes:

- : Potentially complete exposure pathway.
- : Potentially complete exposure pathway to be evaluated in the Corrective Measures Study for groundwater.
- Δ : Pathway is considered to represent $\textit{de minimis}\xspace$ exposure.
- ◊ : Incomplete exposure pathway.
- a: All receptors evaluated under both current and future scenarios.
- b: To be evaluated in the Corrective Measures Study for groundwater.





ODOT PLAN - RIGHT OF WAY



0 200 400 800 1,200 1,600 Feet

Appendix A Screening Tables for Soil Concentrations at SWMUs/AOCs

Table A-1 Screening of Detected Chemicals in Soil - SWMUs 8 and 12 GE Aviation - Evendale, Ohio

		<u> </u>						1		1							1		T				
Sample ID:	Screening Value/Action			SWMU	8-SB10			S	SWMU 8-SB11 SWMU 8-SB12								SWMU 8-SB13 SWMU 8-SB15						
Sample Date:	Level ¹		1992				1992 1992						1992 1992										
Depth (ft bgs):	USEPA Residential Soil RSLs	0-2	4-6	8-10	12-14	16-18	20-22	0-2	4-6	8-10	0-2	4-6	8-10	12-14	16-18	20-22	2-4	4-6	0-2	4-6	10-12	16-18	20-22
Volatile Organic Compounds	CONTROLS		l .		I											I.							
1,1,1-Trichloroethane	8100	23	15		2.3	0.085	0.039	0.033	0.032												6.3		0.012
1,1-Dichloroethane	3.6					1.5			0.077														
1,2-Dichloroethene (total) ²	160	6.9	12	0.066	3.3	1.4	0.034		0.074			0.12	0.092	0.033									
2-Butanone	27000					0.33					0.025	0.012		0.016	0.027	0.041							
2-Methylnaphthalene	240					0.00																	
4-methyl-2-pentanone	33000			0.082		0.23 0.79	0.11	0.15	0.099	0.066	0.1	0.057	0.052	0.06	0.11	0.14		1.8					
Acetone Benzene	61000 1.2			0.12		0.79	0.089	0.15	0.099			0.057	0.052										
Chlorobenzene	280												0.007										
Ethylbenzene	5.8						0.095		0.19	0.12	0.033												
Naphthalene	3.8																						
Tetrachloroethene	24																						0.04
Toluene	4900			0.17	1.4	0.35			0.39	0.061	0.024					0.029		4.8					
Trichloroethene	0.91	8	22	0.022	3.1																		
Vinyl chloride	0.059			0.054		0.59						0.043	0.02										
Xylenes (Total)	580	3.9	4.8	0.046		0.16	0.36	0.077	0.48	0.33	0.29							1.2					
Semivolatile Organic Compounds																							
Acenaphthene	3600	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Anthracene	18000	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Benzo(a)anthracene	0.16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Benzo[a]pyrene	0.016	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Benzo[b]fluoranthene	0.16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Benzo[g,h,i]perylene		na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Benzo[k]fluoranthene	1.6	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
bis(2-Ethylhexyl)Phthalate	39	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na
Chrysene Dibenzofuran	16 73	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluoranthene	2400	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Fluorene	2400	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Indeno[1,2,3-cd]pyrene	0.16	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Phenanthrene		na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Pyrene	1800	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Total Petroleum Hydrocarbons			•	•	•									•		•		•					•
TPH (Total) ³	see note 3	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Polychloroniated Biphenyls					45			1		1	0.00	1	ı	I		1	20	0.0	1				
PCBs (Total) ⁴	0.23	7.4			15						0.63						62	3.2					
Metals	77000	0640	0000	26000	22000	6070	2400	0140	10100	0600	0000	10000	15100	20000	17770	12400	E040	10000	11000	0050	2120	2420	2450
Aluminum	77000	9640 0.31	8830	26900	23600 0.24	6270 0.2	3400	9140	10100 0.13	8680	9800 0.25	10000	15100	20600	17770 0.16	13400	5210 0.39	18200 0.19	11900	9050 0.25	3130 0.41	2420	2450 0.23
Antimony	31	7.6	0.2 7	0.13 5.4	11.2	13.6	0.16 4.6	0.16 9	7.4	0.17 7.4	7	2.7	8.2	6.4	7.5	9.4	6.2	5.1	0.23 4.6	7.8	5.7	2.3	2.4
Arsenic Barium	0.68 15000	62.6	54.5	161	134	291	11.7	44.6	65.8	50.5	62.6	53.8	69.1	131	106	94.4	59.4	111	78.5	42.2	117	8	6.2
Beryllium	160	0.51	0.43	1.2	1.1	0.24	0.22	0.43	0.52	0.39	0.51	0.58	0.78	1	0.88	0.73	0.5	0.9	0.61	0.48	0.16	0.18	0.18
Cadmium	71	0.79	0.79	0.61	0.66	0.63	0.54	0.43	0.57	0.55	0.88	0.96	0.74	0.89	0.96	0.73	1.9	1					
Chromium (Total) ⁵	120000	18	19.4	28.4	25.9	12	8.1	12.4	12.6	13.4	34.4	12.3	19.7	28.9	34.9	19.4	83.8	22.8	14.8	12.2	9.3	4.5	4
Cobalt	23	6.1	4.5	10.6	7.0	2.6	3.2	5.3	4.7	3.7	5.7	6.6	7.3	7.6	8.6	8.5	6.9	9.6	5.7	6.4	1.6	1.5	2
Copper	3100	15.5	12.9	20.4	18.9			15.9	11.7	10.9	17	11.9	11.9	21.5	17.8	15.9	21.2	17.7	14.2	12.1	1.2	7	6.6
Cyanide	23																						
Lead	400	13.9	10.5	17.6	16.2	19	7.5	4.5	11.6	12.2	17.7	11.7	19.9	21	20.3	20.8	55.4	20.8	26.7	10.7	2.2	4.7	3
Manganese	1800	330	302	567	335	330	214	775	362	275	327	233	163	214	735	794	460	468	295	335	461	128	176
Mercury	11																0.44						
Nickel	1500	14.2	11.8	23.1	19.7	4	7.1	15.1	10.5	9.7	18.2	13.2	15.5	18.7	22.5	17.5	56.1	20.4	14.2	36.9	2.4	5.9	6.2
Selenium	390	0.19		0.15	0.19		0.15		0.24	0.12	0.15	0.19											
Silver	390					0.17											0.14						
Thallium	0.78	0.23	0.15	0.28	0.21		0.16	0.23	0.2		0.15		0.19	0.17	0.21	0.24	0.23	0.22					
Vanadium	390 23000	19.6	17.4	51.7	47.6	10.8	9.8	22.1	19.4	17.3	20.2	19.5	32.3	36.9	35.3	28.9	9.4	33.8	24.2	20.6	7.2	9.4	8.4
Zinc		44	42.8	59.0	54.8	19.2	15.8	39.7	35.2	32.4	67.7	40.7	54.9	77.4	68.6	64.2	59.7	57	47.9	253	13.2	19.7	16.2

Table A-1 Screening of Detected Chemicals in Soil - SWMUs 8 and 12 GE Aviation - Evendale, Ohio

Sample ID:	Screening Value/Action	SWMU 8/12 SB13A							SW	/MU 8/12 SE	314		SWMU	J 12-SB1	SWMU 12 SB3		SWMU 12-SS1-92	SWMU 12-SS1-94
Sample Date:	Level ¹			19	92					1992			19	992	19	92	1992	1994
Depth (ft bgs):	USEPA Residential Soil RSLs	0-2	4-6	8-10	12-14	16-18	20-22	0-2	4-6	8-10	12-14	16-18	2-4	10-12	0-2	8-10	0-0.5	0-0.5
Volatile Organic Compounds	OUI NOLS	<u> </u>	<u> </u>	<u> </u>		<u> </u>		<u> </u>							<u> </u>	<u> </u>		
1,1,1-Trichloroethane	8100	4	9.3		12	15		0.045	0.006	0.078	0.048	0.058			0.064	0.016	300	
1,1-Dichloroethane	3.6																	
1,2-Dichloroethene (total) ²	160					8.4												
2-Butanone	27000																	
2-Methylnaphthalene	240												1.2					
4-methyl-2-pentanone	33000																	
Acetone	61000													0.3				
Benzene	1.2													0.73				
Chlorobenzene	280																	
Ethylbenzene	5.8																	
Naphthalene	3.8												2.3					
Tetrachloroethene	24							0.042	0.01	0.058	0.036	0.042			0.048	0.046		3.6
Toluene	4900													0.09				3.1
Trichloroethene	0.91																	
Vinyl chloride	0.059																	 12
Xylenes (Total)	580																	12
Semivolatile Organic Compounds													0.04				ı	
Acenaphthene	3600	na	na	na	na	na	na	na	na	na	na	na	0.64 2.5		na	na		na
Anthracene	18000 0.16	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na	na na	2.9		na na	na na		na na
Benzo(a)anthracene Benzo[a]pyrene	0.16	na	na	na	na	na	na	na	na	na	na	na	2.1		na	na		na
Benzo[b]fluoranthene	0.016	na	na	na	na	na	na	na	na	na	na	na	4.1		na	na		na
Benzo[g,h,i]perylene	0.10	na	na	na	na	na	na	na	na	na	na	na	0.79		na	na		na
Benzo[k]fluoranthene	1.6	na	na	na	na	na	na	na	na	na	na	na	1.4		na	na		na
bis(2-Ethylhexyl)Phthalate	39	na	na	na	na	na	na	na	na	na	na	na	0.64		na	na		na
Chrysene	16	na	na	na	na	na	na	na	na	na	na	na	2.4		na	na		na
Dibenzofuran	73	na	na	na	na	na	na	na	na	na	na	na	2.2		na	na		na
Fluoranthene	2400	na	na	na	na	na	na	na	na	na	na	na	5.9		na	na		na
Fluorene	2400	na	na	na	na	na	na	na	na	na	na	na	3.5		na	na		na
Indeno[1,2,3-cd]pyrene	0.16	na	na	na	na	na	na	na	na	na	na	na	1.1		na	na		na
Phenanthrene		na	na	na	na	na	na	na	na	na	na	na	8.9		na	na		na
Pyrene	1800	na	na	na	na	na	na	na	na	na	na	na	6		na	na		na
Total Petroleum Hydrocarbons																		
TPH (Total) ³	see note 3	4800	410		2000	540		8600	1600	170	120		18000	150		92	46000	12000
Polychloroniated Biphenyls					•													
PCBs (Total) ⁴	0.23	390	0.93		4.6	2.3		100	98	0.89	2.3		na	na	na	na		85
Metals	-	-					-	-							-		-	_
Aluminum	77000	7250	18400	4300	24900	21300	4630	4990	4490	14900	13700	21600	13000	22000	14100	11500	1900	4450
Antimony	31	0.47	0.24	0.23		0.38	0.23	0.55	0.29	0.25		0.27			0.23	0.34	7	0.32
Arsenic	0.68	1.7	2.8	2.1	4.9	18.1	2.9	3	2.9	5.2	8.5	5.4	5.2	4.6	7.6	7.3	1.4	4.7
Barium	15000	84.8	120	21.1	167	110	32.3	39.6	36.3	98.5	105	142	100	150	121	96.3	19	33.8
Beryllium	160	1	0.95	0.24	1.4	1.2	0.31	0.31	0.28	0.76	0.82	1.1	0.9	0.9	0.8	0.71		0.28
Cadmium	71	0.42						2.6	2									1.8
Chromium (Total) ⁵	120000	87.2	21.3	7.5	28.9	24.7	7.4	85.4	43.6	19	19.9	26.7	17	26	17.2	16.8	17	33.4
Cobalt	23	3.8	7.2	2.8	8.1	8.2	3.2	23.1	25.9	8.3	9.1	8.6	10	8	1	7.3	19	3.5
Copper	3100	10.9	17.2	6	57.3	21.9	6.9	58.1	54	16.1	18.6	23.9	17	16	17.3	15.9	13	42.5
Cyanide	23							0.7	0.9								na	
Lead	400	58.6	12.9	5	15	20.1	5.6	17.6	14.9	19.3	25	19.3	17	17	20.8	20.6	23	12.6
Manganese	1800	1570	336	148	244	312	274	353	309	788	642	205	1200	180	328	731	150	390
Mercury	11							0.23	0.25			0.16						
Nickel	1500	19.9	18.7	7.2	24.5	21.3	7.4	94	78.3	17.4	25.5	21.3	18	20	19.5	15.1	57	50.1
Selenium	390		1.3													0.89		
Silver	390																	
Thallium	0.78										0.13					0.14		
Vanadium	390	8.9	35.4	11.6	36	39.1	12.1	11.8	10.6	28.7	26.9	38.8	26	41	26.3	23.5	9	8.8
Zinc	23000	45.7	59.8	22.2	100	78	23	90.5	87.3	68.5	84.1	91.8	67	64	57.7	60.5	4	40.6

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

'bgs' - below ground surface.

'na' - not analyzed for this constituent.

Shaded cells indicate concentrations above the May 2016 USEPA Residential Soil Screening Level.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs do not have a screening value for total 1,2-dichloroethene, therefore the screening level for cis-1,2-dichloroethene has been substituted.
- 3) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).
- 4) Residential RSL for PCBs (high risk) applied.
- 5) Residential RSL for trivalent chromium applied.

Table A-2 Screening of Detected Chemicals in Soil - SWMU 14 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU	14-SB1	SWMU	14-SB2	SWMU 14-SS1	SWMU 14-SS2
Sample Date:	Value/Action Level ¹	19	92	19	992	1992	1992
Depth (ft bgs):	USEPA Residential Soil RSLs	2-4	14-16	2-4	12-14	0-0.5	0-0.5
Metals							
Aluminum	77000	2100	2600	24000	2300		
Antimony	31	18	14		10		
Arsenic	0.68		1.5	6.4	5.8	8.0	4.2
Barium	15000	100	110	130			
Beryllium	160			1.1			
Cadmium	71	92					
Chromium (Total) ²	120000	1400	8	29	4		
Cobalt	23			12		130	12
Copper	3100	300	6	26	7		
Cyanide	23	80					
Lead	400	14	12	14	17		
Manganese	1800	120	190	530	260		
Nickel	1500	1400	39	26	5	==	
Thallium	0.78					==	
Vanadium	390	12	11	46	13	==	
Zinc	23000	480	22	82	10		

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995). '--' denotes non-detection.

'bgs' - below ground surface.

Shaded cells indicate concentrations above the May 2016 USEPA Residential Soil Screening Level.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016)
- 2) Residential RSL for trivalent chromium applied.

Table A-3 Screening of Detected Chemicals in Soil - SWMU 16 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU 16-SB1 1993		SWMU 16-MW2S 1993		SWMU 16-MW3S 1993	
Sample Date:	Value/Action Level ¹						
Sample Date.	USEPA Residential						
Depth (ft bgs):	Soil RSLs	2-4	4-6	8-10	12-14	8-10	18-20
Volatile Organic Compounds							
1,1,1-Trichloroethane	8100			0.017	0.030		
1,2-Dichloroethene (Total) ²	160			0.009	0.031	0.009	
2-Butanone	27000					0.015	
Acetone	61000	0.73		0.024		0.05	0.023
Trichloroethene	0.91				0.27		
Semivolatile Organic Compoun	ds		•	_		-	
Fluoranthene	2400					0.42	
Total Petroleum Hydrocarbons							
TPH (Total) ³	see note 3	340	4600				
Metals							
Aluminum	77000	3800	2600	15200	2360	16100	2380
Antimony	31	8			0.18	0.2	0.18
Arsenic	0.68	4	2.8	23.5	4.9	7.5	3.2
Barium	15000			88.3	8.3	256	7
Beryllium	160			0.81	0.18	1	0.19
Cadmium	71			0.56	0.76	1.5	0.47
Chromium (Total) ⁴	120000	8	7	18.5	3.7	20.5	7.2
Cobalt	23			7.7	2.7	11.8	3.9
Copper	3100	40	60	19.4		13.1	14.8
Lead	400	9.5	12	17.1	3.6	12.8	5
Manganese	1800	290	150	208	643	638	144
Nickel	1500	18	25	16.7	3.8	16.5	12.8
Selenium	390					0.19	0.12
Thallium	0.78			0.34		0.15	0.22
Vanadium	390	12	7	25	7	37.7	9.4
Zinc	23000	22	18	63.6	9.5	53.7	24.2

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

Shaded cells indicate concentrations above the May 2016 USEPA Residential Soil Screening Level.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs do not have a screening value for total 1,2-dichloroethene, therefore the screening level for cis-1,2-dichloroethene has been substituted.
- 3) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH(Aromatic High).
- 4) Residential RSL for trivalent chromium applied.

^{&#}x27;bgs' - below ground surface.

Table A-4 Screening of Detected Chemicals in Soil - SWMU 17 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU 17-SS-1	SWMU 17-SS-2	SWMU 17-SS-3	SWMU 17-SS-4
Sample Date:	Value/Action Level ¹	1992	1992	1992	1992
Depth (ft bgs):	USEPA Residential Soil RSLs	0-0.5	0-0.5	0-0.5	0-0.5
Volatile Organic Compounds	s				
Toluene	4900	10			26
Total Petroleum Hydrocarbo	ns				
TPH	see note 3	220			
Metals					
Aluminum	77000	8400	7500	77000	12000
Arsenic	0.68	18	9.2	17	4.3
Barium	15000	440	210	360	83
Beryllium	160	2.7	1	2.3	0.9
Cadmium	71	1.9			
Chromium (Total) ²	120000	52	17	11	14
Cobalt	23	32	9		10
Copper	3100	50	22	32	14
Lead	400	65	12	8.1	14
Manganese	1800	320	220	90	940
Mercury	11	0.3	0.6		
Nickel	1500	130	28	14	17
Selenium	390	1.3	1.2	2.3	
Silver	390	34			
Vanadium	390	26	24	34	24
Zinc	23000	87	44	62	47

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016)
- 2) Residential RSL for trivalent chromium applied.
- 3) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH(Aromatic High).

^{&#}x27;bgs' - below ground surface.

Table A-5 Screening of Detected Chemicals in Soil - SWMU 18 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWI	MU 18-MW18	SSB	SWMU 18-SB1		SWMU 18-SB	2	SWMU 18-SB3	SWMU	18-SB4	SWMU 18-SS1	SWMU 18-SS2	SWMU 18-SS3	SWMU 18-SS4	SWMU 18-SS5	SWMU 18-SS6
Sample Date:	Value/Action Level ¹		1992		1992		1992		1992	19	992	1992	1992	1992	1992	1992	1992
Depth (ft bgs):	USEPA Residential Soil RSLs	6-8	8-10	26-28	COMP	COMP	4-6	16-18	COMP	COMP	14-16	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Volatile Organic Compounds																	
1,1,1-Trichloroethane	8100		na		na	na	na	na	na	na	na	na	na	na	na	na	na
Acetone	61000		na		na	na	na	na	na	na	na	na	na	na	na	na	na
Methylene Chloride	57		na		na	na	na	na	na	na	na	na	na	na	na	na	na
Naphthalene	4		4.7		na	na	na	na	na	na	na	na	na	na	na	na	na
Toluene	4900		na		na	na	na	na	na	na	na	na	na	na	na	na	na
Total Petroleum Hydrocarbon	s																
TPH (Total) ²	see note 2	na	na	na	na	na	2700	340	na	na	2400	na	na	na	na	na	na
Metals																	
Aluminum	77000	na	na	na	7100	5700	na	na	11000	8900	na	na	na	na	na	na	na
Antimony	31	na	na	na		10	na	na			na	na	na	na	na	na	na
Arsenic	0.68	na	na	na	6.7	17	na	na	13	11	na	8	4.4	14	4.6	5	4.8
Barium	15000	na	na	na	130	120	na	na	210	160	na	na	na	na	na	na	na
Beryllium	160	na	na	na	1	1	na	na	1.9	1.8	na	0.7	0.7	1.5	0.8	0.8	0.7
Cadmium	71	na	na	na		0.7	na	na		8	na	na	na	na	na	na	na
Chromium (Total) ³	120000	na	na	na	12	27	na	na	40	37	na	na	na	na	na	na	na
Cobalt	23	na	na	na	6	7	na	na	12	9	na	na	na	na	na	na	na
Copper	3100	na	na	na	21	28	na	na	60	28	na	na	na	na	na	na	na
Lead	400	na	na	na	16	42	na	na	36	38	na	na	na	na	na	na	na
Manganese	1800	na	na	na	490	500	na	na	340	350	na	na	na	na	na	na	na
Mercury	11	na	na	na		0.5	na	na	0.2	6.3	na	na	na	na	na	na	na
Nickel	1500	na	na	na	18	25	na	na	84	24	na	na	na	na	na	na	na
Selenium	390	na	na	na	2.3	1	na	na	1.6	1.6	na	na	na	na	na	na	na
Silver	390	na	na	na			na	na		4	na	na	na	na	na	na	na
Vanadium	390	na	na	na	23	21	na	na	34	31	na	na	na	na	na	na	na
Zinc	23000	na	na	na	48	130	na	na	66	66	na	na	na	na	na	na	na

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

'bgs' - below ground surface.

- USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016)
 The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH(Aromatic High).
 Residential RSL for trivalent chromium applied.

Table A-6
Screening of Detected Chemicals in Soil - SWMU 19
GE Aviation - Evendale, Ohio

		0)4/4/4	10.004	0)4/4/4	10.000	0)4/14/1	10.000	0)4/4/4	1.40.00.4	011111111111111111111111111111111111111	014/14/14/14/14/14	011111111111111111111111111111111111111	011111111111111111111111111111111111111
Sample ID:	Screening	SWMU	19-5B1	SWIND	19-SB2	SWIND	19-SB3	SWIVIU	l 19-SB4	SWMU 19-SS1	SWMU 19-SS2	SWMU 19-SS3	SWMU 19-SS4
Sample Date:	Value/Action Level ¹	19	93	19	93	19	993	19	993	1993	1993	1993	1993
Depth (ft bgs):	USEPA Residential Soil RSLs	10-12	12-14	14-16	16-18	10-12	12-14	4-6	8-10	0-0.5	0-0.6	0-0.7	0-0.8
Volatile Organic Com	pounds												
1,1,1-Trichloroethane	8100			0.008	0.04	0.006			0.006		-		
Acetone	61000	0.018		0.011	0.014	0.016	0.017		0.014				
Methylene Chloride	57	0.007				0.008	0.006		0.005				
Toluene	4900	0.008				0.011					-		0.012
Metals													
Aluminum	77000	2800	2700	3100	2600	4800	2200	20000	2400	na	na	na	na
Arsenic	0.68	5	4.3	1.3	1.8	6.6	6.4	2.1	1.1	10	11	14	14
Barium	15000			24	14	21		370		na	na	na	na
Beryllium	160							0.9		1.7	1.6	2	2.2
Chromium (Total) ²	120000	6	7	6	5	8	5	23	4	na	na	na	na
Cobalt	23							17		na	8	na	na
Copper	3100	9	6	10	12	13	6	19	4	na	na	na	na
Lead	400	3.8	3.4	4.3	3.8	5	4.4	13	3	na	na	na	na
Manganese	1800	230	200	430	190	170	150	2800	200	na	na	na	na
Nickel	1500	7	5	7	8	10	8	22		na	na	na	na
Silver	390							1		na	na	na	na
Vanadium	390	17	14	18	14	20	13	53	12	na	na	na	na
Zinc	23000	15	13	23	18	18	14	63	10	na	na	na	na

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

'bgs' - below ground surface.

'na' - not analyzed for this constituent.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) Residential RSL for trivalent chromium applied.

Table A-7 Screening of Detected Chemicals in Soil - SWMU 20 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU 20	MW-1S SB	SWMU	20 SB1	SWMU	20 SB2	SWMU	20 SB3	SWMU	20 SB4		SWMU 20 SB	5
Sample Date:	Value/Action Level ¹	19	93	19	993	19	93	19	93	19	993		1993	
Depth (ft bgs):	USEPA Residential Soil RSLs	0-2	6-8	10-12	12-14	2-4	10-12	2-4	12-14	2-4	12-14	2-4	8-10	10-12
Volatile Organic Compounds														
Acetone	61000	0.23			0.045						0.017			
Toluene	4900							0.007						
Trichloroethene	0.91													
Xylenes (Total)	580	9												
Semivolatile Organic Compou	nds										•			
Anthracene	18000													
Benzo(a)anthracene	0.16	0.39												
Benzo[a]pyrene	0.016	0.36												
Benzo[b]fluoranthene	0.16	0.54												
Benzo[g,h,i]perylene		0.23												
Benzo[k]fluoranthene	1.6	0.21												
bis(2-Ethylhexyl)Phthalate	39													
Chrysene	16	0.41												
Fluoranthene	2400	1.1												
Fluorene	2400													
Indeno[1,2,3-cd]pyrene	0.16	0.27												
Phenanthrene		0.85												
Pyrene	1800	0.88												
Total Petroleum Hydrocarbons	- S													
TPH (Total) ²	see note 2	na	na											
Metals						-	•	•	•		•	•		•
Aluminum	77000	na	na	2000	1800	14000	2300	17000	2000	15000	2300	15000	4000	2400
Arsenic	0.68	na	na	3.5	2.5	7.8	2.9	4.9	2.9	6.9	2.8	5.3	4.2	3.3
Barium	15000	na	na			120		130		110		120		
Beryllium	160	na	na			1		1		1		0.9		
Cadmium	71	na	na											
Chromium (Total) ³	120000	na	na	4	4	18	5	20	4	19	4	18	7	5
Cobalt	23	na	na			8		10		9		9		
Copper	3100	na	na	7	6	13	8	14	5	18	8	14	20	8
Lead	400	na	na	5.2	2.6	18	3.6	11	2.6	11	3.9	16	7.8	4
Manganese	1800	na	na	140	150	500	160	580	130	630	140	2900	160	150
Mercury	11	na	na											
Nickel	1500	na	na	5		15	6	16		19	5	15	13	7
Silver	390	na	na											
Vanadium	390	na	na	12	11	31	12	33	13	32	14	30	13	13
Zinc	23000	na	na	18	14	64	19	53	16	58	12	68	41	19

Sample ID:	Screening	SWMU	20 SB6	SWMU	20 SB7	SWMU	20 SB8	SWMU	20 SB9	SWMU	20 SB10
Sample Date:	Value/Action Level ¹	19	93	19	93	19	93	19	993	19	93
Depth (ft bgs):	USEPA Residential Soil RSLs	4-6	12-14	2-4	8-10	2-4	14-16	2-4	10-12	2-4	8-10
Volatile Organic Compounds						_				_	
Acetone	61000			0.066	0.044		0.052		0.054		
Toluene	4900			0.040	0.008		0.006		0.006		
Trichloroethene	0.91				0.024						
Xylenes (Total)	580										
Semivolatile Organic Compour	nds										
Anthracene	18000	-	-		0.9						
Benzo(a)anthracene	0.16				2.9						
Benzo[a]pyrene	0.016				2.5						
Benzo[b]fluoranthene	0.16				4.6						
Benzo[g,h,i]perylene					1.1						
Benzo[k]fluoranthene	1.6				1.3						
bis(2-Ethylhexyl)Phthalate	39			0.440							
Chrysene	16				2.1						
Fluoranthene	2400				3.9						
Fluorene	2400				0.450						
Indeno[1,2,3-cd]pyrene	0.16				1.6						
Phenanthrene					2.7						
Pyrene	1800				5.0						
Total Petroleum Hydrocarbons	3										
TPH (Total) ²	see note 2	1	1		170						
Metals											
Aluminum	77000	15000	1600	12000	16000	18000	2500	16000	5900	21000	4400
Arsenic	0.68	6.4	2.7	4.9	6.2	8.2	3	4.1	6.1	9	9.3
Barium	15000	180		110	240	110	180	130	37	120	46
Beryllium	160	1		0.7	0.9	0.9		0.9		0.8	
Cadmium	71	-			1.5						
Chromium (Total) ³	120000	30	3	20	26	21	5	20	9	26	8
Cobalt	23	16			9	11		10	6	14	10
Copper	3100	45	6	170	120	16	8	15	15	19	14
Lead	400	26	3.2	31	44	20	4.4	13	7.9	13	7.6
Manganese	1800	810	140	380	500	440	190	700	380	620	1500
Mercury	11	0.30		0.2	1.2						
Nickel	1500	36		73	53	18	6	18	16	23	20
Silver	390				1						
Vanadium	390	34	11	22	33	35	14	32	20	45	16
Zinc	23000	110	14	170	210	64	22	56	45	80	35

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA,May 2016);
 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High). 3) Residential RSL for trivalent chromium applied.

Notes:
- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
'--' denotes non-detection.

^{&#}x27;bgs' - below ground surface.

Table A-8 Screening of Detected Chemicals in Soil - SWMUs 21 and 22 GE Aviation - Evendale, Ohio

Volatic Organic Compounds	Sample ID: Sample Date:	Screening Value/Action Level ¹	SWMU 19	21-SB1 93		21-SB2 93		21-SB3 93		21-SB4 993		1 21-SB5 993		22-MW-1S SB 993
11.1-Trichicoentane	•	USEPA Residential	16-18	18-20	2-4	16-18	12-14	18-20	4-6	16-18	8-10	12-14	12-14	16-18
11.1-Trichicoentane	Volatile Organic Compounds				•		•							1
1,2 Delicrochemen (Total)		8100												0.008
1.4-Dehoroberozene						0.31								
2-80 transparence 27000				0.08										
Acetone	,													
Carbon Disulfide														+
Trichbroreshere						1		1				i		
Viryl chloride			14	20		0.1		0.13						
Sylene Semi-boration Sem														
Semivolatile Organic Compounds						i		1		1	0.54	0.033		
Acenaphthee 3600 0.4	· · · ·										0.0	0.000		1
Anthracene 18000			-		0.4									
Benzoclajanthracene										i		1		+
Benzolalpyrene														1
Benzo Dilucranthene														
Benzo(gh,l)perylene		0.16												
Benzolk Uoranthene 1.6										i				
bis(2Ethylhexyl)Phthalate 39 9.7 14 1.7		1.6												
Chysene			9.7	14		1.7								
Dibenzia high inthracene 0.016		16			1.8									
Fluoranthene 2400										i		i		
Indepn(1,2,3-cd pyene 0.16														
Phenanthrene	Indeno[1,2,3-cd]pyrene	0.16												
Pyrene 1800														
TPH (Total) See note 2 3800 680 7700 230	Pyrene	1800			7									
Polychloroniated Biphenyls	Total Petroleum Hydrocarbon	ıs												
PCBs (Total) ⁴ 0.23 3 2.5 9 3.0 Metals	TPH (Total) ³	see note 2	3800	680	7700	230								
Metals Aluminum 77000 7500 5800 21000 3300 3530 3990 1740 8980 21200 200000 5600 2230 Antimony 31 25 50 10 19 10.6 11.8 10.4 3.1 9.2 10.5 Arsenic 0.68 3.3 2.1 5.5 1.3 9 1.9 0.89 3.4 9.6 6.5 6.2 0.85 Barium 15000 110 130 280 110 11.8 11.4 8.8 47.3 121 113 21.8 7.2 Beryllium 160 3 0.35 0.66 0.20 0.71 1.1 1.2 0.7 0.36 Cadmium 71 42 210 1.8 65 0.27 0.72 0.36 Cadmium 10.20 <td>Polychloroniated Biphenyls</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>•</td> <td></td> <td></td> <td></td> <td>•</td> <td></td> <td>•</td>	Polychloroniated Biphenyls							•				•		•
Metals	PCBs (Total) ⁴	0.23	3	2.5	9							3.0		
Antimony 31 25 50 10 19 10.6 11.8 10.4 3.1 9.2 10.5 Arsenic 0.68 3.3 2.1 5.5 1.3 9 1.9 0.89 3.4 9.6 6.5 6.2 0.85 6.2 0.2 0.71 1.1 1.2 0.7 0.36 6.3 6.2 0.35 6.2						l.		l.						
Antimony 31 25 50 10 19 10.6 11.8 10.4 3.1 9.2 10.5 Arsenic 0.68 3.3 2.1 5.5 1.3 9 1.9 0.89 3.4 9.6 6.5 6.2 0.85 6.2 0.2 0.71 1.1 1.2 0.7 0.36 6.3 6.2 0.35 6.2		77000	7500	5800	21000	3300	3530	3990	1740	8980	21200	20000	5600	2230
Arsenic 0.68 3.3 2.1 5.5 1.3 9 1.9 0.89 3.4 9.6 6.5 6.2 0.85 Barium 15000 110 130 280 110 11.8 11.4 8.8 47.3 121 113 21.8 7.2 Beryllium 160 3 0.35 0.66 0.20 0.71 1.1 11.2 0.7 0.36 Cadmium 71 42 210 1.8 65 0.27 0.72 0.27 0.72 0.27 0.72 0.27 0.72 0.72 0.27 0.72 0.72 0.23 1.1 1.2 2.5 3 0.82 3.7 7.5 9.1 6.1 1.3 Copper 3100 1400														
Barium														
Beryllium														
Cadmium 71 42 210 1.8 65 0.27 0.72														
Chromium (Total) ⁵ 120000 760 4800 53 1300 19.3 26.5 11.3 253 24 30.3 19.1 6.3 Cobalt 23 95 12 12 2.5 3 0.82 3.7 7.5 9.1 6.1 1.3 Copper 3100 1400 5100 51 710 37.3 <														
Cobalt 23 95 12 12 2.5 3 0.82 3.7 7.5 9.1 6.1 1.3 Copper 3100 1400 5100 51 710 37.3														
Copper 3100 1400 5100 51 710 37.3														
Cyanide 23 1400 1500										i i		1	-	ĺ
Lead 400 63 140 77 44 4.7 8.8 3.3 8.2 13.1 20.5 3.6 5.2 Manganese 1800 130 180 1600 110 255 173 31.1 279 207 351 150 124 Mercury 11 0.20 -														+
Manganese 1800 130 180 1600 110 255 173 31.1 279 207 351 150 124 Mercury 11 0.20														
Mercury 11 0.20														
Nickel 1500 4200 38000 63 4600 16.4 16.2 18.5 17.4 23.8 23.2 Selenium 390										1		i		1
Selenium 390 0.58 Silver 390 2 -														
Silver 390 2 Thallium 0.78 0.11 0.12 0.24 0.17 Vanadium 390 17 18 26 16 15.6 16.6 4 22.1 37.9 36.3 19 11.8														1
Thallium 0.78 0.11 0.12 0.24 0.17 Vanadium 390 17 18 26 16 15.6 16.6 4 22.1 37.9 36.3 19 11.8														+
Vanadium 390 17 18 26 16 15.6 16.6 4 22.1 37.9 36.3 19 11.8						1								\
IZINC ■ 23000 ■ 400 3000 ■ 130 520 ■ 122 233 ■ 75 285 ■ 402 605 ■ 190 112	Zinc	23000	400	3000	130	520	12.2	23.3	7.5	28.5	49.3	90.5	18.9	11.3

- Notes:
 Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.
- 'bgs' below ground surface.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA,May 2016);
 2) The USEPA Residential RSLs do not have a screening value for total 1,2-dichloroethene, therefore the screening level for cis-1,2-dichloroethene has been substituted.
 3) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).
- 4) Residential RSL for PCBs (high risk) applied.
- 5) Residential RSL for trivalent chromium applied.

Table A-9 Screening of Detected Chemicals in Soil - SWMUs 27 and 28 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU 2	7/28-SB1	SWMU 27/2	8 MW-1S SB
Sample Date:	Value/Action Level ¹		93		93
Sample Date.		13	,55 	13	
Depth (ft bgs):	USEPA Residential Soil RSLs	6-8	12-14	10-12	12-14
Volatile Organic Compounds					
1,1,1-Trichloroethane	8100	0.2			
2-Butanone	27000		0.014		
Acetone	61000	0.15	0.038		
Benzene	1.2	0.019			
Methylene Chloride	57	0.017			
Naphthalene	3.8				
Toluene	4900	0.66			
Trichloroethene	0.91	0.073			
Metals				_	
Aluminum	77000	10000	12000	na	na
Arsenic	0.68	20	13	na	na
Barium	15000	300	180	na	na
Beryllium	160	2.8	2	na	na
Chromium (Total) ²	120000	14	16	na	na
Cobalt	23	11	9	na	na
Copper	3100	24	21	na	na
Lead	400	12	14	na	na
Manganese	1800	420	240	na	na
Nickel	1500	19	17	na	na
Selenium	390		1.8	na	na
Vanadium	390	40	33	na	na
Zinc	23000	36	48	na	na

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016);
- 2) Residential RSL for trivalent chromium applied.

^{&#}x27;--' denotes non-detection.

^{&#}x27;bgs' - below ground surface.

^{&#}x27;na' - not analyzed for this constituent.

Table A-10 Screening of Detected Chemicals in Soil - SWMU 29 GE Aviation - Evendale, Ohio

Sample ID:	Screening		SWMU 29 SB-1		SWMU 29-SS-1	SWMU 29-SS-2	SWMU 29-SS-3	SWMU 29-SS-4
Sample Date:	Value/Action Level ¹		1993		1993	1993	1993	1993
Depth (ft bgs):	USEPA Residential Soil RSLs	2-4	8-10	10-12	0-0.5	0-0.5	0-0.5	0-0.5
Volatile Organic Compounds								
1,1,1-Trichloroethane	8100	-			na	na	na	na
2-Butanone	27000				na	na	na	na
Acetone	61000	0.031	0.11	0.082	na	na	na	na
Benzene	1.2				na	na	na	na
Methylene Chloride	57	0.012	0.017	0.010	na	na	na	na
Toluene	4900				na	na	na	na
Trichloroethene	0.91				na	na	na	na
Total Petroleum Hydrocarbons	-				_	-	•	
TPH (Total) ²	see note 2		170		na	na	na	na
Metals								
Aluminum	77000	4700	4600	24000			-	
Arsenic	0.68	4.5		5.4	23.3	1.8	13.7	230
Barium	15000	86	140	320				
Beryllium	160		1	2.4	0.44			0.56
Cadmium	71							51.2
Chromium (Total) ³	120000	8	4	21				
Cobalt	23			22	6.4	3.5	4.7	25.5
Copper	3100	12	8	20				
Lead	400	69	6.1	40				3540
Manganese	1800	70	60	2500				
Nickel	1500			28				
Selenium	390							
Vanadium	390	22	16	45				1570
Zinc	23000	70	35	56				

Notes:
- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
'--' denotes non-detection.
'bgs' - below ground surface.
Shaded cells indicate concentrations above the May 2016 USEPA Residential Soil Screening Level.

- USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
 The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kgfor TPH (Aromatic High).
- 3) Residential RSL for trivalent chromium applied.

Table A-11 Screening of Detected Chemicals in Soil - SWMU 31 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU	I 31 SB-1
Sample Date:	Value/Action Level ¹	1	993
Depth (ft bgs):	USEPA Residential Soil RSLs	4-6	10-12
Volatile Organic Compounds			
1,1,1-Trichloroethane	8100		
2-Butanone	27000		0.018
Acetone	61000	0.14	0.096
Methylene Chloride	57	0.008	0.01
Semivolatile Organic Compounds			
Pyrene	1,800		0.81
Total Petroleum Hydrocarbons			
TPH (Total) ²	see note 2	160	780
Metals			
Aluminum	77000	11000	9000
Antimony	31	10	
Arsenic	0.68	2.9	8.5
Barium	15000	110	360
Beryllium	160	1.1	2.1
Chromium (Total) ³	120000	13	17
Copper	3100	18	27
Lead	400	18	53
Manganese	1800	120	120
Nickel	1500	15	74
Selenium	390		1.5
Vanadium	390	20	37
Zinc	23000	38	56

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).
- 3) Residential RSL for trivalent chromium applied.

^{&#}x27;--' denotes non-detection.

^{&#}x27;bgs' - below ground surface.

Table A-12 Screening of Detected Chemicals in Soil - SWMU 42 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SS-2	0 SB1								
Sample Date:	Value/Action Level ¹	19	993								
Depth (ft bgs):	USEPA Residential Soil RSLs	6-8	18-20								
Volatile Organic Compounds											
Acetone	61000	0.05									
Trichloroethene	0.91		0.33								
Metals											
Cadmium	71	4.7	1.7								

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

Shaded cells indicate concentrations above the May 2016 USEPA Residential Soil Screening Level.

^{&#}x27;bgs' - below ground surface.

Table A-13 Screening of Detected Chemicals in Soil - SWMU 61 GE Aviation - Evendale, Ohio

Sample ID:	Screening	1			/67MW-2S	SWMU 61/	67 MW-3S	
Sample Date:	Value/Action Level ¹	1993		19	993	1993		
Depth (ft bgs):	USEPA Residential Soil RSLs	18-20	20-22	16-18	18-20	16-18	18-20	
Volatile Organic Compounds								
Acetone	61000	0.011	0.12					

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

'bgs' - below ground surface.

Shaded cells indicate concentrations above the May 2016 USEPA Residential Soil Screening Level.

Table A-14
Screening of Detected Chemicals in Soil - SWMU 79
GE Aviation - Evendale, Ohio

Sample ID:	Screening Value/	SWMU 79-SS1	SWMU 79-SS2	SWMU 79-SS3	SWMU 79-SS4	SWMU 79-SS5	SWMU 79-SS6	SWMU 79-SS7	SWMU 79-SS8	SWMU 79-SS9
Sample Date:	Action Level ¹	1993	1993	1993	1993	1993	1993	1993	1993	1993
Depth (ft bgs):	USEPA Residential Soil RSLs	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5	0-0.5
Metals										
Arsenic	0.68	4.1	2.3	2.7	3.9	3.2	3.9	2.4	2.1	12
Beryllium	160									0.9
Cadmium	71		320							
Cobalt	23								38	

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).

Shaded cells indicate concentrations above the May 2016 USEPA Residential Soil Screening Level.

^{&#}x27;--' denotes non-detection.

^{&#}x27;bgs' - below ground surface.

Table A-15 Screening of Detected Chemicals in Soil - SWMU 86 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU 86	6-MW4S SB			
Sample Date:	Value/Action Level ¹	19	994			
Depth (ft bgs):	USEPA Residential Soil RSLs	16-18 18-20				
Volatile Organic Compounds						
1,1,1-Trichloroethane	8100	0.1	0.079			
Tetrachloroethene	24		0.007			
Trichloroethene	0.91	0.18	0.099			
Metals						
Arsenic	0.68	1.9	2			
Cobalt	23	1.7	2.4			

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).

Shaded cells indicate concentrations above the May 2016 USEPA Residential Soil Screening Level.

^{&#}x27;--' denotes non-detection.

^{&#}x27;bgs' - below ground surface.

Table A-16 Screening of Detected Chemicals in Soil - SWMUs 87 and 88 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU 87/88-SB1				
Sample Date:	Value/Action Level ¹	1	993			
Depth (ft bgs):	USEPA Residential Soil RSLs	2-4	12-14			
Volatile Organic Compounds						
Acetone	61000	0.013				
Total Petroleum Hydrocarbons						
TPH (Total) ²	see note 2	120	100			
Polychloroniated Biphenyls						
PCBs (Total) ³	0.23 1.53					
Metals						
Arsenic	0.68	7	6.5			
Cobalt	23	7.2	3.3			

Notes

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

'bgs' - below ground surface.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).
- 3) Residential RSL for PCBs (high risk) applied.

Table A-17 Screening of Detected Chemicals in Soil - SWMUs 93 and 94 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU Tank 500-1-SB1		SWMU 93	/94-MW2S
Sample Date:	Value/Action Level ¹	19	93	19	93
Depth (ft bgs):	USEPA Residential Soil RSLs	2-4 16-18		8-10	14-16
Volatile Organic Compounds					
Acetone	61000	0.023	na	0.74	0.49
Benzene	1.2		na	0.048	0.16
Ethylbenzene	5.8		na	0.075	
Total Petroleum Hydrocarbons		_			
TPH (Total) ²	see note 2			480	430
Metals					
Arsenic	0.68	na	na	7.3	7.3
Beryllium	160	na	na	1.1	1.2
Cobalt	23	na	na	6.9	9.2

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995)

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH(Aromatic Low), 96 mg/kg for TPH(Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).

^{&#}x27;--' denotes non-detection.

^{&#}x27;bgs' - denotes 'below ground surface'

^{&#}x27;na' denotes Not Analyzed.

Table A-18 Screening of Detected Chemicals in Soil - SWMU 95 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU 95 MW-3S SB			
Sample Date:	Value/Action Level ¹	199	93		
Depth (ft bgs):	USEPA Residential Soil RSLs	12-14 16-18			
Volatile Organic Compounds					
1,1,1-Trichloroethane	8100	0.022			
Tetrachloroethene	24	0.012			
Toluene	4900	0.009			
Trichloroethene	0.91	0.029			
Metals					
Arsenic	0.68	3	2.5		
Beryllium	160	0.56	0.64		
Cobalt	23	3.3	2.1		

Notes

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

'bgs' - below ground surface.

Shaded cells indicate concentrations above the May 2016 USEPA Residential Soil Screening Level.

Table A-19 Screening of Detected Chemicals in Soil - SWMUs 98 and 99 GE Aviation - Evendale, Ohio

	Sample ID:	Screening	SWMU 98/99 MW-1S SB		
	Sample Date:	Value/Action Level ¹	19	993	
	Depth (ft bgs):	USEPA Residential Soil RSLs	12-14	14-16	
Volatile Organic Compou	ınds				
1,1,1-Trichloroethane		8100	0.02	0.053	
Trichloroethene		0.91	0.29	0.77	
Total Petroleum Hydroca	rbons				
TPH (Total) ²		see note 2	130	64	
Metals	_				
Arsenic		0.68	2.6	2.9	
Cobalt		23	1.5	2.1	

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).

^{&#}x27;bgs' - below ground surface.

Table A-20 Screening of Detected Chemicals in Soil - SWMU 100 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU 100 MW-5S SB			
Sample Date:	Value/Action Level ¹	199	93		
Depth (ft bgs):	USEPA Residential Soil RSLs	12-14	14-16		
Volatile Organic Compounds					
1,1,1-Trichloroethane	8100		0.014		
1,1-Dichloroethane	3.6		0.01		
1,2-Dichloroethene (total) ²	160		0.006		
Trichloroethene	0.91	0.012	0.016		
Total Petroleum Hydrocarbons					
TPH (Total) ³	see note 2		na		
Metals					
Arsenic	0.68	5	5.7		
Cobalt	23	3.4	3.2		

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

'bgs' - below ground surface.

'na' - not analyzed for this constituent.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs do not have a screening value for total 1,2-dichloroethene, therefore the screening level for cis-1,2-dichloroethene has been substituted.
- 3) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).

Table A-21 Screening of Detected Chemicals in Soil - SWMU 122 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU 122-MW1S SB				
Sample Date:	Value/Action Level ¹	199	3			
Depth (ft bgs):	USEPA Residential Soil RSLs	10-12	16-18			
Volatile Organic Compounds						
1,1,1-Trichloroethane	8100	0.011	0.024			
Trichloroethene	0.91		0.007			
Metals						
Aluminum	77000	3520	3440			
Antimony	31	12.9	12.9			
Arsenic	0.68	2	6.9			
Barium	15000	10.5	10.7			
Beryllium	160	0.57	0.46			
Chromium (Total) ²	120000	7.3	6.8			
Cobalt	23	2.9	3			
Lead	400	4.6	2.8			
Manganese	1800	162	289			
Vanadium	390	17.6	14			
Zinc	23000	10.9	14.6			

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).

'bgs' - below ground surface.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) Residential RSL for trivalent chromium applied.

^{&#}x27;--' denotes non-detection.

Table A-22 Screening of Detected Chemicals in Soil - SWMU 123 GE Aviation - Evendale, Ohio

0		0)4/4/11/4/00	Sample ID: Screening SWMU 123-MW-1S SB							
Sample ID:	Screening	SWINU 123	-IVIVV-12 2B							
Sample Date:	Value/Action Level ¹	19	93							
Depth (ft bgs):	USEPA Residential Soil RSLs	10-12	12-14							
Volatile Organic Compounds										
1,1,1-Trichloroethane	8100		0.49							
Acetone	61000	0.12								
Trichloroethene	0.91		0.13							
Total Petroleum Hydrocarbons										
TPH (Total) ²	see note 2		70							
Metals										
Aluminum	77000	5130	2780							
Antimony	31	7.2	11.2							
Arsenic	0.68	5.4	6.4							
Barium	15000	36.4	10.6							
Beryllium	160	0.73	0.59							
Chromium (Total) ³	120000	8.1	4.7							
Cobalt	23	4.6	3.1							
Copper	3100	6	7.5							
Lead	400	4.9	4							
Manganese	1800	428	211							
Nickel	1500	7.4	6.2							
Thallium	0.78		0.14							
Vanadium	390	18.6	13.5							
Zinc	23000	21.2	28.5							

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).
- 3) Residential RSL for trivalent chromium applied.

^{&#}x27;--' denotes non-detection.

^{&#}x27;bgs' - below ground surface.

Table A-23 Screening of Detected Chemicals in Soil - SWMU 124 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU 124	-MW1S SB	AOC K-SS1	AOC	K-SB1
Sample Date:	Value/Action Level ¹	19	93	1993	1993	
Depth (ft bgs):	USEPA Residential Soil RSLs	14-16	20-22	0-0.5	4-6	14-16
Volatile Organic Compounds						
1,1,1-Trichloroethane	8100		0.01			
Acetone	61000				0.07	0.089
Benzene	1.2					0.66
Trichloroethene	0.91	0.31	0.02			
Total Petroleum Hydrocarbons						
TPH (Total) ²	see note 2	60	140		220	
Metals						
Aluminum	77000	2730	3570	na	na	na
Antimony	31	11.5	12.6	na	na	na
Arsenic	0.68	18.2	3.1	na	na	na
Barium	15000	8.7	10.2	na	na	na
Beryllium	160	0.45	0.61	na	na	na
Chromium (Total) ³	120000	7	12.6	na	na	na
Cobalt	23	2.6	2.8	na	na	na
Copper	3100	-	7.1	na	na	na
Cyanide	23		0.5	na	na	na
Lead	400	2.8	4	na	na	na
Manganese	1800	229	198	na	na	na
Nickel	1500		6.9	na	na	na
Selenium	390		0.21	na	na	na
Thallium	0.78		0.11	na	na	na
Vanadium	390	13.7	21	na	na	na
Zinc	23000	11.7	21.4	na	na	na

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

'bgs' - below ground surface.

'na' - not analyzed for this constituent.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).
- 3) Residential RSL for trivalent chromium applied.

Table A-24 Screening of Detected Chemicals in Soil - SWMU 141 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SD 26-SB1			
Sample Date:	Value/Action Level ¹	1993			
Depth (ft bgs):	USEPA Residential Soil RSLs	0-0.5 6-8		26-28	28-30
Volatile Organic Compounds					
1,1,1-Trichloroethane	8100			0.047	0.031
Acetone	61000	0.019			
cis-1,2-Dichloroethene	160			0.063	0.052
Trichloroethene	0.91			0.8	0.69
Total Petroleum Hydrocarbons					
TPH (Total) ²	see note 2	11796			

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).

^{&#}x27;bgs' - below ground surface.

Table A-25 Screening of Detected Chemicals in Soil - SWMU 142 GE Aviation - Evendale, Ohio

0		0)4/14/14/10 004	014/14/14/14/14/14/14/14/14/14/14/14/14/1	014/14/14/14/14/14/14/14/14/14/14/14/14/1		
Sample ID:	Screening	SWMU 142-SS1	SWMU 142-SS2	SWMU 142-SS3		
Sample Date:	Value/Action Level ¹	1992	1992	1992		
Depth (ft bgs):	USEPA Residential Soil RSLs	0-0.5	0-0.5	0-0.5		
Volatile Organic Compounds						
1,1,1-Trichloroethane 8100 0.098 0.14 0.13						
Methylene Chloride	57		0.009	0.007		
Tetrachloroethene	24	0.062	0.1	0.014		
Total Petroleum Hydrocarbons						
TPH (Total) ²	see note 2	8000	23000	5000		
Metals						
Aluminum	77000	13900	9090	6410		
Antimony	31	0.22	0.55	0.22		
Arsenic	0.68	5.4	6.5	4.3		
Barium	15000	103	61.7	43.5		
Beryllium	160	0.61	0.47	0.34		
Chromium (Total) ³	120000	17.4	14.2	9.6		
Cobalt	23	9.3	87.4	18.3		
Copper	3100	13.3	22.4	9.7		
Lead	400	12.9	10.9	8.3		
Manganese	1800	601	466	261		
Nickel	1500	20.4	21.8	10.9		
Thallium	0.78			0.16		
Vanadium	390	30.8	20.1	15.2		
Zinc	23000	50.2	37.5	30		

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).
- 3) Residential RSL for trivalent chromium applied.

^{&#}x27;--' denotes non-detection.

^{&#}x27;bgs' - below ground surface.

Table A-26 Screening of Detected Chemicals in Soil - AOC A GE Aviation - Evendale, Ohio

Sample ID:	Screening	SS 27-SB1		SS 27-SB2		
Sample Date:	Value/Action Level ¹	19	993		1993	
Depth (ft bgs):	USEPA Residential Soil RSLs	0-2	2-4	0-2	2-4	8-10
Volatile Organic Compounds						
1,1,1-Trichloroethane	8100	0.007	0.064			
Tetrachloroethene	24	0.035	0.017			
Toluene	4900	0.035	0.013			
Trichloroethene	0.91	0.035	0.053			
Xylenes (Total)	580	0.013				
Total Petroleum Hydrocarbons						
TPH (Total) ²	see note 2	83	55	77		

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).

^{&#}x27;bgs' - below ground surface.

Table A-27 Screening of Detected Chemicals in Soil - AOCs D and I GE Aviation - Evendale, Ohio

Sample ID:	Screening	SS-29	-SB-01	SS-29	-SB-02	ST-32	-SB-01	ST-33	-SB-01
Sample Date:	Value/Action Level ¹	1991		1991		1993		19	93
Depth (ft bgs):	USEPA Residential Soil RSLs	18-20 20-22		18-20 20-22		0-2 2-4		0-2	8-10
Total Petroleum Hydrocarbons		<u> </u>							
TPH (Total) ²	see note 2	1066 1359		53	2247	1,735	659	4,327	530

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).

^{&#}x27;--' denotes non-detection.

^{&#}x27;bgs' - below ground surface.

Table A-28 Screening of Detected Chemicals in Soil - AOC L GE Aviation - Evendale, Ohio

Sample ID:	Screening	AOC	L-SB1	AOC L-SS1	AOC L-M	1W1S-SB					
Sample Date:	Value/Action Level ¹	19	92	1992	19	92					
Depth (ft bgs):	USEPA Residential Soil RSLs	6-8	8-10	0-0.5	8-10	12-14					
Semivolatile Organic Compoun	ıds										
2-Methylnaphthalene	240				6.7	8.3					
Naphthalene	3.8				4.7	3.4					
Total Petroleum Hydrocarbons	Total Petroleum Hydrocarbons										
TPH (Total) ²	see note 2	3700	2700		na	na					

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

'bgs' - below ground surface.

'na' - not analyzed for this constituent.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).

Table A-29
Screening of Detected Chemicals in Soil - AOC W2 and SWMUs 62 and 63
GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU 6	2/63 SB1	SWMU 62/6	3-MW2S SB	SWMU 62/6	3-MW3S SB	SWMU 62/6	3-MW4S SB
Sample Date:	Value/Action Level ¹	1993		19	993	19	93	1993	
Depth (ft bgs):	USEPA Residential Soil RSLs	0-2	2-4	4-6	20-22	4-6	6-8	4-6	12-14
Volatile Organic Compounds									
1,1,1-Trichloroethane	8100				0.027				
2-Butanone	27000		0.038	0.02				2.7	1.7
Acetone	61000		0.34						
Ethylbenzene	5.8					0.1			
Trichloroethene	0.91				0.1				
Xylenes (Total)	580	-				0.28			
Total Petroleum Hydrocarbons									
TPH (Total) ²	see note 2					290		85	250

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).

'bgs' - below ground surface.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).

^{&#}x27;--' denotes non-detection.

Table A-30 Screening of Detected Chemicals in Soil - AOC W3 and SWMUs 64 and 68 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU 64/68	-SB1 (MW-1S)	SWMU 6	64/68-SB2	SWMU Tar	nk 505-SB1	SWMU Ta	nk 505-SB2	SWMU Tank 505-SB3		SWMU Tank 505-SB4	
Sample Date:	Value/Action Level ¹	19	992	19	992	19	94	19	94	19	94	19	94
Depth (ft bgs):	USEPA Residential Soil RSLs	0-2	16-18	2-4	14-16	16-18	18-20	10-12	14-16	14-16	18-20	12-14	16-18
Volatile Organic Compounds													
2-Butanone	27000						na	2.1	1.7		na	na	
Acetone	61000	0.18					na				na	na	
Ethylbenzene	5.8					0.056	na				na	na	
Methylene Chloride	57						na				na	na	
Xylenes (Total)	580			1			na				na	na	
Total Petroleum Hydrocarbon	ıs												
TPH (Total) ^{2,3}	see note 2	140	170			110	100	71	370		140	98	

Sample ID:	Screening	SWMU Tar	ık 505-SB5	SWMU Tai	nk 505-SB6	SWMU Ta	nk 505-SB7	SWMU Ta	nk 505-SB8	SWMU Tar	nk 505-SB9	SWMU Tan	k 505-SB10
Sample Date:	Value/Action Level ¹	19	94	19	94	19	994	19	994	19	94	19	94
Depth (ft bgs):	USEPA Residential Soil RSLs	12-14	16-18	10-12	14-16	2-4	4-6	0-2	18-20	8-10	14-16	2-4	12-14
Volatile Organic Compounds													
2-Butanone	27000		na		na		1.8		0.062				
Acetone	61000		na		na								
Ethylbenzene	5.8		na		na								
Methylene Chloride	57		na		na								
Xylenes (Total)	580		na		na								
Total Petroleum Hydrocarbon	ıs			•	•		•						•
TPH (Total) ^{2,3}	see note 2	740	350	760	1000			63		120		210	

Sample ID:	Screening	SWMU Tan	k 505-SB11	SWMU Tan	k 505-SB12	SWMU Tan	k 505-SB13	SWMU Tank 505-SB14		SWMU Tank 505-SB15	
Sample Date:	Value/Action Level ¹	19	94	19	94	19	94	19	94	19	94
Depth (ft bgs):	USEPA Residential Soil RSLs	12-14	16-18	6-8	18-20	16-18	18-20	16-18	18-20	16-18	18-20
Volatile Organic Compounds											
2-Butanone	27000		na	na			na		na	na	
Acetone	61000		na	na			na		na	na	
Ethylbenzene	5.8		na	na			na	2.8	na	na	
Methylene Chloride	57		na	na			na		na	na	
Xylenes (Total)	580		na	na		5.8	na	3.5	na	na	
Total Petroleum Hydrocarbon	ıs										
TPH (Total) ^{2,3}	see note 2		9100	110	380		1500	250	1900	110	820

Notes

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

'bgs' - below ground surface.

'na' - not analyzed for this constituent.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).

Table A-31 Screening of Detected Chemicals in Soil - AOC W4 and SWMU 65 GE Aviation - Evendale, Ohio

Sample ID:	Screening	SWMU	65-SB1	SWMU	65-SB2	AOC V	V4-SB1	AOC V	V4-SB2	UST50	07-SB1	UST50	07-SB2
Sample Date:	Value/Action Level ¹	19	1992		1992		92	19	92	19	992	1992	
Depth (ft bgs):	USEPA Residential Soil RSLs	14-16	16-18	10-12	14-16	14-16	16-18	14-16	18-20	0-2	10-12	10-12	20-22
Volatile Organic Compounds													
2-Butanone	27000									0.014			
Acetone	61000	0.17	0.12	0.092	0.093			0.027					
Benzene	1.2							0.008					
Toluene	4900			0.005	0.015			0.019					
Total Petroleum Hydrocarbons	s												
TPH (Total) ²	see note 2					130	na	2400	6500				
0 I- ID		LICTE	LICTEOZ CDO LICTEOZ CD4		LICTEO7 CDE		LICTEO7 CDC		LICTEOT CD7		LICTEO7 CD0		

Sample ID:	Screening	UST50	7-SB3	UST50	07-SB4	UST50	7-SB5	UST50	07-SB6	UST507-SB7		UST507-SB8	
Sample Date:	Value/Action Level ¹	19	94	19	94	19	94	19	994	19	994	19	94
Depth (ft bgs):	USEPA Residential Soil RSLs	14-16	16-18	14-16	18-20	14-16	20-22	8-10	20-22	2-4	14-16	8-10	12-14
Volatile Organic Compounds	_					_							
2-Butanone	27000			na					na	na			na
Acetone	61000			na					na	na	0.012	0.015	na
Benzene	1.2			na					na	na			na
Toluene	4900	-		na					na	na			na
Total Petroleum Hydrocarbons	3		•	•	•	•	•					•	
TPH (Total) ²	see note 2	6400	1200	1200	2600	8000	900		71				

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).

'bgs' - below ground surface.

'na' - not analyzed for this constituent.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).

^{&#}x27;--' denotes non-detection.

Table A-32 Screening of Detected Chemicals in Soil - AOC W10, SWMU 72 GE Aviation - Evendale, Ohio

Sample ID: Sample Date:	Screening Value/Action Level ¹			-14 93			ST-15 1993			-16 93	ST 19	-17 93	ST-18 1993	
Depth (ft bgs):	USEPA Residential Soil RSLs	0-2	0-2 14-16 16-18 20-22				1-3 12-14 14-16			12-14	10-12	12-14	10-12	12-14
Volatile Organic Compounds														
Acetone	61000												0.089	
Total Petroleum Hydrocarbons														
TPH (Total) ²	see note 2		1531 1448 8029			57	21	738	68	2750	306	371	136	4887

Notes:

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

'bgs' - below ground surface.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs for TPH ranges are: 82 mg/kg for TPH (Aromatic Low), 96 mg/kg for TPH (Aliphatic Medium), and 2,500 mg/kg for TPH (Aromatic High).

Table A-33
Screening of Detected Chemicals in Soil - AOC LD
GE Aviation - Evendale, Ohio

Sample ID:	Screening		AOC LD-SB1		AOC	_D-SB2	AOC L	.D-SB3	AOC LD-SB4			
Sample Date:	Value/Action Level ¹		1994		19	994	19	94	1994			
Depth (ft bgs):	USEPA Residential Soil RSLs	2-4 10-12 12-14			12-14	14-16	6-8	16-18	10-12	14-16		
Volatile Organic Compounds												
1,1,1-Trichloroethane	8100		4.6	7.6			0.023	0.031	2.3	0.046		
1,2-Dichloroethene (Total) ²	160											
Acetone	61000	0.015					0.019	0.037				
Tetrachloroethene	24											
Trichloroethene	0.91	2.8 4.3		9.2	4.2	0.028	0.095	1.7	0.19			

Sample ID:	Screening	AOC L	D-SB5	AOC	CLD-SB6	AOC LD-MW-2S	AOC LD	-MW-3S	
Sample Date:	Value/Action Level ¹	1994			1994	1994	19	94	
Depth (ft bgs):	USEPA Residential Soil RSLs	14-16 16-18		14-16	16-18	16-18	12-14	16-18	
Volatile Organic Compounds									
1,1,1-Trichloroethane	8100	0.042	0.69	0.079	0.047	6.1	0.006	0.22	
1,2-Dichloroethene (Total) ²	160			0.046					
Acetone	61000	0.017							
Tetrachloroethene	24						0.006		
Trichloroethene	0.91	0.12 0.78		0.79	0.46	9.6	0.009	0.073	

Notes

- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

'bgs' - below ground surface.

- 1) USEPA Regional Screening Level (RSL) Residential (USEPA, May 2016).
- 2) The USEPA Residential RSLs do not have a screening value for total 1,2-cichloroethene, therefore the screening level for cis-1,2-dichloroethene has been substituted.

Table A-34 Screening of Detected Chemicals in Soil - AOC PST GE Aviation - Evendale, Ohio

Sample ID: Sample Date:	Screening Value/Action Level ¹	AOC P:	ST-SB1 92		ST-SB2 92		ST-SB3 992	AOC PST-SB4 1992		AOC PST-SB5 1992	
Depth (ft bgs):	USEPA Residential Soil RSLs	8-10	12-14	10-12	14-16	12-14	14-16	10-12	14-16	12-14	14-16
Volatile Organic Compounds											
1,1,1-Trichloroethane	8100	12	9.7	44	61	16	13	1.9	1.1	1.3	1.4
Acetone	61000										
Trichloroethene	0.91	6.6	6.2	14	25	6.8	6.4	0.95		0.7	0.76

Sample ID: Sample Date:	Screening Value/Action Level ¹	AOC PST-SB6 1992		AOC PST-SB7 1992		AOC PST-SB8 1992		AOC PST-SB9 1992	
Depth (ft bgs):	USEPA Residential Soil RSLs	12-14	14-16	4-6	12-14	10-12	12-14	8-10	10-12
Volatile Organic Compounds									
1,1,1-Trichloroethane	8100	20	14	2	6.1	9.6	3	12	12
Acetone	61000								15
Trichloroethene	0.91	13	10	1.4	3.9	5.5	1.8	7.8	8

Notes:

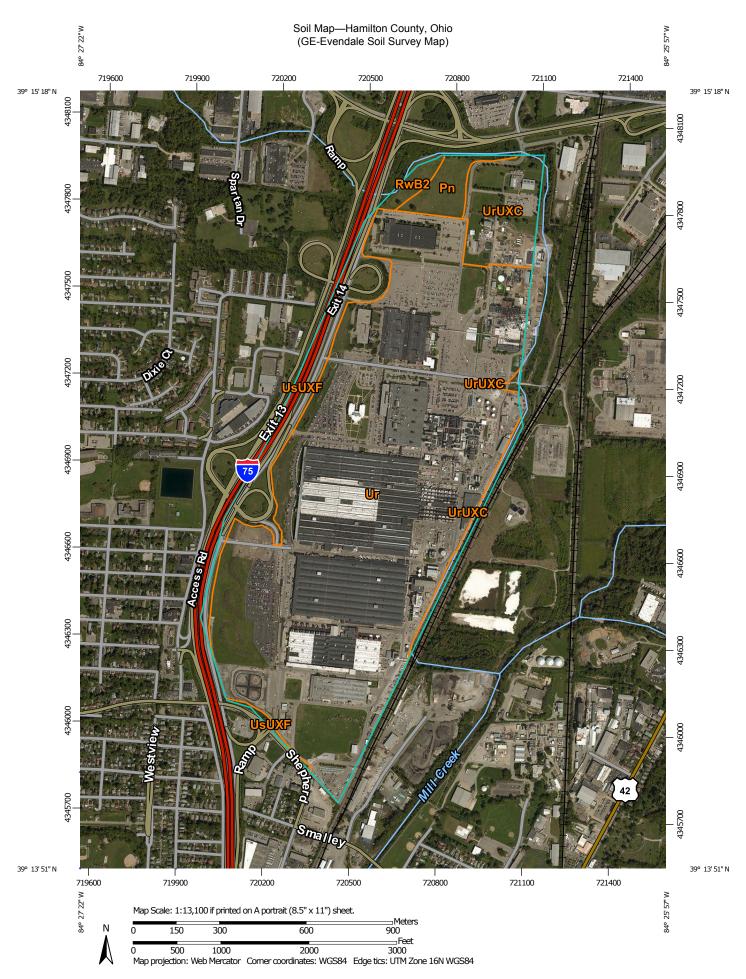
- Results and action levels are expressed in mg/kg.
- Analytical results are from the RCRA Facility Investigation Revised Draft Report (O'Brien & Gere 1995).
- '--' denotes non-detection.

Shaded cells indicate concentrations above the May 2016 USEPA Residential Soil Screening Level.

^{&#}x27;bgs' - below ground surface.

Appendix B

Natural Resources
Conservation Service Soil
Survey Map – GE Evendale
Facility



MAP LEGEND

0

Δ

Water Features

Transportation

Background

Spoil Area

Stony Spot

Wet Spot

Other

Rails

US Routes

Major Roads

Local Roads

Very Stony Spot

Special Line Features

Streams and Canals

Interstate Highways

Aerial Photography

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Candfill

A Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

** Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Hamilton County, Ohio Survey Area Data: Version 16, Oct 5, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 26, 2014—Oct 26, 2014

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Hamilton County, Ohio (OH061)							
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI				
Pn	Patton silty clay loam, 0 to 2 percent slopes	8.4	2.3%				
RwB2	Russell silt loam, 3 to 8 percent slopes, eroded	3.6	1.0%				
Ur	Urban Land	294.3	81.2%				
UrUXC	Urban Land-Udorthents complex, 0 to 12 percent slopes	28.1	7.8%				
UsUXF	Urban Land-Udorthents complex, smoothed, 0 to 50 percent slopes	27.8	7.7%				
Totals for Area of Interest		362.3	100.0%				

Appendix C

Risk-Based Soil Cleanup
Goals for Facility
Constituents of Potential
Concerns

EXPOSURE PARAMETER ESTIMATES

Values selected for the exposure parameters used to support the development of risk-based soil cleanup goals are presented in Tables C-7 through C-12, and are discussed below. The majority of values selected for this evaluation are derived from USEPA risk assessment guidance but site-specific values are utilized where this information is available. It should be noted that several of the exposure parameter values used in this evaluation are also incorporated into the most recent update of the USEPA's *Standard Default Exposure Factors* (USEPA, 2014) and USEPA's Regional Screening Levels (RSLs).

Dermal Absorption Factor

The dermal absorption factor (ABS, unitless) represents the fraction of the soil chemical that may be absorbed through the skin during each exposure event. In general, metals are poorly absorbed through the skin; organic chemicals may be absorbed more readily. Chemical-specific values were obtained from the USEPA's *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) (RAGS Part E, USEPA, 2004, Exhibit 3-4).* Table 2 of that document presents the available chemical-specific values used in the HHRA.

Soil-to-Skin Adherence Factor

The soil to skin adherence factor (AF, mg/cm²) represents the average mass of soil that adheres to the skin over each exposure event. The AF depends on the specific activity being conducted and is higher for body parts with greater exposure to the media. AFs are therefore derived as the body part-weighted average estimates for each potential receptor, considering the specific activities in which each potential receptor group is likely to participate. The specific AFs were obtained from USEPA's *RAGS Part E* (USEPA 2004, Exhibit 3-3) and *Standard Default Exposure Factors* (USEPA, 2014). The AF values selected for each potential receptor is summarized below.

- For an outdoor industrial worker, the AF value is 0.12 mg/cm², the USEPA recommended value for outdoor workers (USEPA, 2014).
- For a utility worker, the AF value is 0.2 mg/cm², the geometric mean weighted soil AF for utility workers (USEPA, 2004).
- For a construction worker, the AF value is 0.3 mg/cm². This value is based on the 95th percentile weighted soil AF for construction workers (USEPA, 2004).
- For older child and adult trespassers, the AF value is 0.07 mg/cm. This value is the recommended soil adherence value for adult residents (USEPA, 2014).

Averaging Time

The averaging time (AT, days) is the time period over which exposure is averaged. In accordance with *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Part A* (*RAGS Part* A, USEPA 1989, Exhibits 6-11 through 6-19), the averaging time for exposure to potential carcinogenic compounds (AT-C) is 25,550 days. This accounts for exposure to a carcinogenic substance over a 70-year lifetime. For exposure to non-carcinogens, the averaging time (AT-NC) is calculated as the exposure duration (years) multiplied by 365 days per year (USEPA, 1989, Exhibits 6-11 through 6-19). Therefore, the averaging time for exposure to non-carcinogenic substances varies by potential receptor and depends on exposure duration.

Body Weight

The body weight (BW, kg) estimates are receptor-specific for adults and older children. A default adult body weight of 80 kg (USEPA 2014) was applied for all potential adult receptors (industrial workers, utility worker, construction worker, adult trespasser). For older children (12 - <18 years), a body weight of 56.8 kg was used. This value is based on mean values for yearly age groups reported by USEPA in its *Exposure Factors Handbook: 2011 Edition* (USEPA, 2011, Table 8-1 [adults and older children]).

Exposure Duration

The exposure duration (ED) is an estimate of the time period over which a potential receptor is exposed and is typically expressed in years. Because the duration of exposure can vary greatly for construction workers, utility workers, and trespassers, there are no recommended ED values for these groups of potential receptors. Therefore, the selection of ED values was based on best professional judgment. The ED values for each potential receptor are discussed below.

- For outdoor and indoor industrial workers, an ED of 25 years was applied. This exposure duration is consistent
 with the USEPA recommended values for industrial workers (USEPA, 2014).
- The ED value for the utility worker is based on the USEPA recommended value for industrial workers (USEPA, 2014), as discussed above.
- For the construction worker, an ED of 1 year was applied. This value is based on professional judgment, assuming that 1 year is a conservative estimate of the duration of a representative construction project at the Facility.
- For the older child trespasser, an ED value of 6 years was applied. For the adult trespasser, an ED value of 25 years is assumed.

Exposure Frequency

Exposure frequency (EF, in days/year) is a receptor-specific estimate of how frequently exposure occurs. The EF values described below are based on best professional judgment for the majority of the potential receptor groups.

- For the outdoor industrial worker, an EF of 225 days/year was applied, consistent with the USEPA recommended value for outdoor workers (USEPA, 2014).
- For the indoor industrial worker, an EF of 250 days/year was applied. This value is consistent with USEPA's recommended ED value indoor workers (USEPA, 2014).
- An EF of 24 days/year was assumed for the utility worker to address the periodic servicing, repair, and maintenance of underground utilities at the Facility.
- An EF of 120 days/year is assumed for the construction worker. This EF assumes that a construction project will require 24 weeks of a construction worker's time (working five days per week) over the course of a given year.
- The EF for trespassers (older child and adult) is 78 days/year, and assumes that a trespasser will visit the Facility two times per week during the nine warmer months of the year.

Exposure Time

The exposure time (ET, in hours/day) is a receptor-specific parameter that applies to inhalation exposure and describes the length of time over which potential exposure occurs. ET values used in this HHRA for each exposure scenario were developed based on best professional judgment, and correspond to typical or estimated daily time periods spent by these potential receptors at jobsites.

- The ET value selected for the industrial workers, utility worker, and construction worker is 8 hours/day. This value is consistent with USEPA's supplemental guidance for inhalation risk assessment, which generally defines a typical workday for construction and commercial-industrial workers as 8 hours (USEPA, 2009; 2014).
- For persons trespassing at the Facility, an ET of 4 hours/day was selected based on best professional judgment.

Soil Ingestion Rate

The soil ingestion rate (IR, in mg/day) refers to the rate at which bulk soil or soil dust is incidentally ingested. The IR values were obtained from USEPA's *Update of Standard Default Exposure Factors* (USEPA, 2014). Soil ingestion rates used in the HHRA are described below.

- For the outdoor industrial worker and utility workers, the IR value is 100 mg/day. This value is consistent with the USEPA recommended value for outdoor workers (USEPA, 2014).
- For the indoor industrial worker, the IR value is 50 mg/day, and corresponds to the recommended value for indoor workers in USEPA's *Update of Standard Default Exposure Factors* (USEPA, 2014).
- The IR value applied for the construction worker is 330 mg/day, and is consistent with the USEPA, recommended high-end soil ingestion value for construction workers (USEPA 2014).
- The IR value for the older child and adult trespasser is 100 mg/day, and is based on USEPA recommended soil ingestion rate for adult residents (USEPA, 2014).

Skin Surface Area Estimates

Skin surface area (SA) for dermal absorption (cm²) represents the exposed surface area of the skin that may contact soil, and is highly dependent on the age of the potential receptor and the nature of activity or work they are conducting. The SA values used in the development of risk-based soil cleanup goals at the Facility are as follows:

- The SA values for the outdoor industrial worker, utility worker, and construction worker are identical (3,470 cm²), and consistent with USEPA recommended skin surface area value for outdoor workers (USEPA, 2014).
- For the adolescent trespasser, the SA value for surface soil exposure is 4,849 cm² based on the 50th percentile average male and female adult surface areas for the face, forearms, hands, and lower legs (USEPA, 2004, Exhibit C-1).
- The adult trespasser SA value is 6,032 cm², and is consistent with USEPA's recommended skin surface area value for adult residents (USEPA, 2014).

AIR EMISSION RATES

Inhalation of soil dust and ambient vapors are viable potential exposure routes at the Facility that must be accounted in the derivation of risk-based soil cleanup goals. Of the soil chemicals retained as COPCs, non-volatile chemicals that partition to airborne particulates (i.e., soil dust) are evaluated as particulate emissions. Volatile chemicals that partition to the ambient air in gaseous form are evaluated as vapor phase emissions.

The particulate emission factor (PEF) is a site-specific parameter that describes the emission flux of soil particulates (i.e., soil dust) in ambient air. Derivation of the PEF incorporates site-specific meteorological information, site size, and the fraction of vegetative cover. Volatilization of organic chemicals from affected soil to the atmosphere and subsequent inhalation also represents a potentially complete pathway for human exposure at the Facility. The relationship between the concentration of a volatile chemical in soil and the flux of the chemical to the air is explained by the volatilization factor (VF). The values for VF are specific to each COPC of sufficiently volatile behavior in soil. PEFs and VFs for evaluating the ambient inhalation pathway were calculated based on methodologies presented in USEPA's *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (USEPA, 2002). Derivation of the PEF and VF terms are presented in Tables C-13 through C-16.

Particulate Emission Factor

The equation used to derive the PEF for dust inhalation is as follows:

PEF (m³/kg) = Q/C×
$$\frac{3600}{0.036 \times (1 \times V) \times (U_{m}/U_{t})^{3} \times F(x)}$$

where:

Q/C = Dispersion factor for wind erosion $(g/m^2-s per kg/m^3)$;

V = Fraction of vegetative cover (unitless);

 U_m = Mean annual wind speed (m/s);

 U_t = Equivalent threshold value of wind speed at 7 m (m/s); and

F(x) = Function dependent on U_m/U_t (unitless).

The PEF for the Facility was derived using Equation 4-5 of USEPA (2002), as presented above. Site-specific values for mean annual wind speed (U_m), fraction of vegetative cover (V), and areal extent of potentially affected soil (A) were used to derive the PEFs (Table C-13). An average wind speed (4.02 m/s) was applied based on average annual wind speed data for the Cincinnati area (Current Results 2015). A vegetative cover (V) value of 0.2 (20%) was applied for the Facility, based on the estimated proportion of vegetative cover. Additionally, the areal extent of potentially affected soil (A) was derived by calculating the combined acreage of the SWMUs/AOCs with chemical concentrations above Industrial Soil RSLs and/or background values (metals), as evaluated in Table 1; this value for A is 51.2 acres (see Table C-17) and is based on SMWU/AOC-specific information in the 1995 RFI Report (O'Brien & Gere 1995). The application of the Industrial Soil RSL to derive the A term focuses on the SWMUs with more elevated concentrations of COPCs (i.e., COPCs above Industrial Soil RSLs) rather than those with lower concentrations (i.e., COPCs with levels above only the Resident Soil RSLs), resulting in a lower PEF and therefore a more conservative cleanup goal based on the inhalation pathway. Default parameter values provided in USEPA (2002) were utilized for the equivalent threshold value of wind speed at 7 meters (Ut; 11.32 m/s), and F(x) (0.194).

The Q/C term is an air dispersion factor and is derived from air dispersion constants (A, B, and C) for each of 29 specific meteorological locations within nine climate zones selected to be representative of the range of meteorological conditions across the continental United States, as defined by USEPA (2002) (Table C-14). The air dispersion constants for Zone VII (Chicago, IL, Cleveland, OH, Harrisburg, PA, Huntingdon, WV), which includes the greater Cincinnati area, were applied to calculate the PEF for this assessment.

Volatilization Factor

The equation used to derive VFs for volatile COPCs is as follows:

$$VF(m^3/kg) = Q/C \times \frac{(3.14 \times D_A \times T)^{1/2}}{(2 \times \rho_b \times D_A)} \times 10^{-4} (m^2/cm^2)$$

where:

Q/C = Dispersion factor for volatilization (g/m²-s per kg/m³);

 D_A = Apparent diffusivity (cm²/s);

T = Exposure interval (s); and

 ρ_b = Dry soil bulk density (g/cm³).

The D_A term is chemical-specific, and is calculated using default values for soil bulk density (ρ_b), soil particle density, water-filled soil porosity, and soil organic carbon content. Chemical-specific values for diffusivity in water, diffusivity in air, soil organic carbon partition coefficient, and Henry's Law constant are also applied to develop the value for D_A (Table C-15). The T term describes the interval of potential exposure, and is a default value for non-residential exposures from USEPA (2002). The Q/C term described above is also incorporated into the VF derivation.

Given that total petroleum hydrocarbons (TPH) consist of a mixture of compounds that exhibit both non-volatile and volatile properties, both the PEF and VF are applied to derive the risk-based cleanup goals for TPH. This approach takes into account the potential for TPH to be incidentally inhaled in both particulate and vapor phases.

TABLE C-1 DERIVATION OF SOIL CLEANUP GOALS - OUTDOOR INDUSTRIAL WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Exposure Pathway Soil Cleanup Goal Equations

Soil Ingestion RG (non-carcinogenic) = $\underline{THQ \times BW \times ATn}$

 $\mathsf{EF} \times \mathsf{ED} \times (\mathsf{1/RfDo}) \times \mathsf{IR} \times \mathsf{CF1}$

Soil Ingestion RG (carcinogenic) = $\underline{TR \times BW \times ATc}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{CSFo} \times \mathsf{IR} \times \mathsf{CF1}$

Soil Dermal RG (non-carcinogenic) = $\underline{\text{THQ} \times \text{BW} \times \text{ATn}}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{1/(RfDo} \times \mathsf{GIABS)} \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Dermal RG (carcinogenic) = $\underline{TR \times BW \times ATc}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{(CSFo/GIABS)} \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Inhalation RG (non-carcinogenic) = $\underline{\text{THQ} \times \text{ATn}}$

 $EF \times ED \times ET \times CF2 \times (1/RfC) \times (1/VF + 1/PEF)^{1}$

Soil Inhalation RG (carcinogenic) = $\underline{TR \times ATc}$

Constituent of Potential Concern	Oral Reference Dose mg/kg-day	Oral Cancer Slope Factor (mg/kg-day) ⁻¹	Ingestion RG mg/kg	Oral Reference Dose (adjusted for gastrointestinal absorption) mg/kg-day	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption) (mg/kg-day) ¹	Dermal RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m³) ⁻¹	Inhalation RG mg/kg	Surface Soil RG (all pathways) mg/kg
INORGANICS										
Arsenic (non-carcinogenic)	3.00E-04		3.89E+02	3.00E-04		3.12E+03	1.50E-05		4.30E+04	3.43E+02
Arsenic (carcinogenic)		1.50E+00	2.42E+01		1.50E+00	1.94E+02		4.30E+00	1.87E+04	2.15E+01
Cadmium (non-carcinogenic)	1.00E-03		1.30E+03	2.50E-05		7.79E+03	1.00E-05		2.87E+04	1.24E+03
Cadmium (carcinogenic)								1.80E+00	4.46E+04	4.46E+04
Cobalt (non-carcinogenic)	3.00E-04		3.89E+02	3.00E-04		NC	6.00E-06		1.72E+04	3.81E+02
Cobalt (carcinogenic)								9.00E+00	8.92E+03	8.92E+03
Copper (non-carcinogenic)	4.00E-02		5.19E+04	4.00E-02		NC				5.19E+04
Copper (carcinogenic)			-							
Cyanide (non-carcinogenic)	6.00E-04		7.79E+02	6.00E-04		NC	8.00E-04		2.29E+06	7.78E+02
Cyanide (carcinogenic)		-							-	
Manganese (non-carcinogenic)	2.40E-02		3.11E+04	9.60E-04		NC	5.00E-05		1.43E+05	2.56E+04
Manganese (carcinogenic)		-	-							
Vanadium (non-carcinogenic)	5.00E-03		6.49E+03	1.30E-04		NC	1.00E-04		2.87E+05	6.35E+03
Vanadium (carcinogenic)			-							

TABLE C-1 DERIVATION OF SOIL CLEANUP GOALS - OUTDOOR INDUSTRIAL WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Exposure Pathway	Soil Cleanup Goal Equations
Soil Ingestion RG (non-carcinogenic) =	$\frac{\text{THQ} \times \text{BW} \times \text{ATn}}{\text{EF} \times \text{ED} \times (1/\text{RfDo}) \times \text{IR} \times \text{CF1}}$
Soil Ingestion RG (carcinogenic) =	$\frac{\text{TR} \times \text{BW} \times \text{ATc}}{\text{EF} \times \text{ED} \times \text{CSFo} \times \text{IR} \times \text{CF1}}$
Soil Dermal RG (non-carcinogenic) =	$\frac{\text{THQ} \times \text{BW} \times \text{ATn}}{\text{EF} \times \text{ED} \times \text{1/(RfDo} \times \text{GIABS)} \times \text{SA} \times \text{AF} \times \text{ABS} \times \text{CF1}}$
Soil Dermal RG (carcinogenic) =	$\frac{TR \times BW \times ATc}{EF \times ED \times (CSFo/GIABS) \times SA \times AF \times ABS \times CF1}$
Soil Inhalation RG (non-carcinogenic) =	$\frac{\text{THQ} \times \text{ATn}}{\text{EF} \times \text{ED} \times \text{ET} \times \text{CF2} \times (1/\text{RfC}) \times (1/\text{VF} + 1/\text{PEF})^1}$
Call Inhalation BC (association)	TD v ATc

Soil Inhalation RG (carcinogenic) = $\frac{TR \times ATc}{EF \times ED \times ET \times CF2 \times IUR \times \left(1/VF + 1/PEF\right)^{1}}$

Constituent of Potential Concern	Oral Reference Dose mg/kg-day	Oral Cancer Slope Factor (mg/kg-day) ⁻¹	Ingestion RG mg/kg	Oral Reference Dose (adjusted for gastrointestinal absorption) mg/kg-day	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption) (mg/kg-day) ⁻¹	Dermal RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m ³) ⁻¹	Inhalation RG mg/kg	Surface Soil RG (all pathways) mg/kg
POLYCYCLIC AROMATIC HYDROCARBONS										
Benzo(a)anthracene (non-carcinogenic)										
Benzo(a)anthracene (carcinogenic)		7.30E-01	4.98E+01		7.30E-01	9.20E+01	-	1.10E-01	7.30E+05	3.23E+01
Benzo(a)pyrene (non-carcinogenic)										
Benzo(a)pyrene (carcinogenic)		7.30E+00	4.98E+00		7.30E+00	9.20E+00		1.10E+00	7.30E+04	3.23E+00
Benzo(b)fluoranthene (non-carcinogenic)										
Benzo(b)fluoranthene (carcinogenic)		7.30E-01	4.98E+01		7.30E-01	9.20E+01		1.10E-01	7.30E+05	3.23E+01
Dibenz(a,h)anthracene (non-carcinogenic)										
Dibenz(a,h)anthracene (carcinogenic)		7.30E+00	4.98E+00		7.30E+00	9.20E+00		1.20E+00	6.69E+04	3.23E+00
Indeno(1,2,3-cd)pyrene (non-carcinogenic)										
Indeno(1,2,3-cd)pyrene (carcinogenic)		7.30E-01	4.98E+01		7.30E-01	9.20E+01		1.10E-01	7.30E+05	3.23E+01
Naphthalene (non-carcinogenic)	2.00E-02		2.60E+04	2.00E-02		4.79E+04	3.00E-03		5.18E+03	3.96E+03
Naphthalene (carcinogenic)								3.40E-02	1.42E+03	1.42E+03
TOTAL PETROLEUM HYDROCARBONS										
Total Petroleum Hydrocarbons (non-carcinogenic)	4.00E-03		5.19E+03	4.00E-03		NC	3.00E-03		5.82E+03	2.74E+03
Total Petroleum Hydrocarbons (carcinogenic)										

TABLE C-1 DERIVATION OF SOIL CLEANUP GOALS - OUTDOOR INDUSTRIAL WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

		Exposure	e Pathway	Soil (Cleanup Goal Equati	ons				
	Soil Ing	gestion RG (non	-carcinogenic) =		$\frac{\text{THQ} \times \text{BW} \times \text{ATn}}{\text{ED} \times (\text{1/RfDo}) \times \text{IR} \times \text{IR}}$	< CF1				
	So	oil Ingestion RG	(carcinogenic) =		$\frac{TR \times BW \times ATc}{\times \; ED \times CSFo \times IR \times C}$	CF1				
	-carcinogenic) =		$\frac{\text{THQ} \times \text{BW} \times \text{ATn}}{\text{EF} \times \text{ED} \times \text{1/(RfDo} \times \text{GIABS)} \times \text{SA} \times \text{AF} \times \text{ABS} \times \text{CF1}}$							
	(carcinogenic) =		$\frac{TR \times BW \times ATc}{EF \times ED \times (CSFo/GIABS) \times SA \times AF \times ABS \times CF1}$							
	Soil Inha	alation RG (non	-carcinogenic) =	$\frac{\text{THQ} \times \text{ATn}}{\text{EF} \times \text{ED} \times \text{ET} \times \text{CF2} \times (\text{1/RFC}) \times (\text{1/VF} + \text{1/PEF})^{1}}$						
	Soi	l Inhalation RG	(carcinogenic) =		$\frac{TR \times ATC}{ET \times CF2 \times IUR \times (1/V)}$	/F + 1/PEF) ¹				
Constituent of Potential Concern	Oral Reference Dose (adjusted for gastrointestinal absorption) mg/kg-day	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption) (mg/kg-day) ⁻¹	Dermal RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m³) ⁻¹	Inhalation RG mg/kg	Surface Soil RG (all pathways) mg/kg			
POLYCHLORINATED BIPHENYLS	Constituent of Potential Concern mg/kg-day (mg/kg-day) ⁻¹ mg/kg									
PCBs - high risk (non-carcinogenic)										
PCBs - high risk (carcinogenic)	1.82E+01		2.00E+00	3.12E+01		5.70E-01	1.41E+05	1.15E+01		
VOLATILE ORGANIC COMPOUNDS										
Trichloroethene (non-carcinogenic)	5.00E-04		6.49E+02	5.00E-04		NC	2.00E-03		1.36E+02	1.13E+02

3.00E-03

4.60E-02

7.20E-01

NC

NC

NC

1.00E-01

4.10E-03

4.40E-03

4.65E+02

1.95E+03

1.24E+02

Notes:

Cells highlighted in **blue** are the lowest calculated soil remediation goal for that constituent.

NC - Not calculable. Dermal absorption factor not available.

RG - Soil cleanup goal

Trichloroethene (carcinogenic)

Vinyl chloride (carcinogenic)

Vinyl chloride (non-carcinogenic)

7.90E+02

3.89E+03

5.05E+01

4.60E-02

7.20E-01

3.00E-03

2.93E+02

1.30E+03

3.59E+01

¹Soil Inhalation RG calculated using the particulate emission factor (PEF) for non-volatiles and the volatilization factor (VF) for volatiles; inhalation RG for TPH calculated using both the PEF and VF.

TABLE C-2 DERIVATION OF SOIL CLEANUP GOALS - INDOOR INDUSTRIAL WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Exposure Pathway Soil Cleanup Goal Equations

Soil Ingestion RG (non-carcinogenic) = $\underline{THQ \times BW \times ATn}$

 $\mathsf{EF} \times \mathsf{ED} \times (1/\mathsf{RfDo}) \times \mathsf{IR} \times \mathsf{CF1}$

Soil Ingestion RG (carcinogenic) = $\underline{TR \times BW \times ATc}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{CSFo} \times \mathsf{IR} \times \mathsf{CF1}$

Soil Inhalation RG (non-carcinogenic) = $\underline{\text{THQ} \times \text{ATn}}$

 $EF \times ED \times ET \times CF2 \times (1/RfC) \times (1/VF + 1/PEF)^{1}$

Soil Inhalation RG (carcinogenic) = $\underline{TR \times ATc}$

	Oral Reference	Oral Cancer Slope Factor	Ingestion RG	Inhalation Reference Concentration	Inhalation Unit Risk	Inhalation RG	Surface Soil RG (all pathways)
Constituent of Potential Concern	mg/kg-day	(mg/kg-day) ⁻¹	mg/kg	mg/m³	(mg/m ³) ⁻¹	mg/kg	mg/kg
INORGANICS	<u>.</u>						
Arsenic (non-carcinogenic)	3.00E-04		7.01E+02	1.50E-05		3.87E+04	6.88E+02
Arsenic (carcinogenic)		1.50E+00	4.36E+01		4.30E+00	1.68E+04	4.35E+01
Cadmium (non-carcinogenic)	1.00E-03		2.34E+03	1.00E-05		2.58E+04	2.14E+03
Cadmium (carcinogenic)					1.80E+00	4.02E+04	4.02E+04
Cobalt (non-carcinogenic)	3.00E-04		7.01E+02	6.00E-06		1.55E+04	6.70E+02
Cobalt (carcinogenic)					9.00E+00	8.03E+03	8.03E+03
Copper (non-carcinogenic)	4.00E-02		9.34E+04				9.34E+04
Copper (carcinogenic)							
Cyanide (non-carcinogenic)	6.00E-04		1.40E+03	8.00E-04		2.07E+06	1.40E+03
Cyanide (carcinogenic)							
Manganese (non-carcinogenic)	2.40E-02		5.61E+04	5.00E-05		1.29E+05	3.91E+04
Manganese (carcinogenic)							
Vanadium (non-carcinogenic)	5.00E-03		1.17E+04	1.00E-04		2.58E+05	1.12E+04
Vanadium (carcinogenic)							
POLYCYCLIC AROMATIC HYDROCARBONS							
Benzo(a)anthracene (non-carcinogenic)							
Benzo(a)anthracene (carcinogenic)		7.30E-01	8.96E+01		1.10E-01	6.57E+05	8.96E+01
Benzo(a)pyrene (non-carcinogenic)							
Benzo(a)pyrene (carcinogenic)		7.30E+00	8.96E+00		1.10E+00	6.57E+04	8.96E+00
Benzo(b)fluoranthene (non-carcinogenic)							
Benzo(b)fluoranthene (carcinogenic)		7.30E-01	8.96E+01		1.10E-01	6.57E+05	8.96E+01

TABLE C-2 DERIVATION OF SOIL CLEANUP GOALS - INDOOR INDUSTRIAL WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Exposure Pathway	Soil Cleanup Goal Equations
Soil Ingestion RG (non-carcinogenic) =	$\frac{\text{THQ} \times \text{BW} \times \text{ATn}}{\text{EF} \times \text{ED} \times (\text{1/RfDo}) \times \text{IR} \times \text{CF1}}$
Soil Ingestion RG (carcinogenic) =	$\frac{TR \times BW \times ATc}{EF \times ED \times CSFo \times IR \times CF1}$
Soil Inhalation RG (non-carcinogenic) =	$\frac{\text{THQ} \times \text{ATn}}{\text{EF} \times \text{ED} \times \text{ET} \times \text{CF2} \times (\text{1/RfC}) \times (\text{1/VF} + \text{1/PEF})^{1}}$
Soil Inhalation RG (carcinogenic) =	$\frac{TR \times ATc}{EF \times ED \times ET \times CF2 \times IUR \times (1/VF + 1/PEF)^{1}}$

Constituent of Potential Concern	Oral Reference Dose mg/kg-day	Oral Cancer Slope Factor (mg/kg-day) ⁻¹	Ingestion RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m³) ⁻¹	Inhalation RG mg/kg	Surface Soil RG (all pathways) mg/kg
Dibenz(a,h)anthracene (non-carcinogenic)							
Dibenz(a,h)anthracene (carcinogenic)		7.30E+00	8.96E+00		1.20E+00	6.02E+04	8.96E+00
Indeno(1,2,3-cd)pyrene (non-carcinogenic)							
Indeno(1,2,3-cd)pyrene (carcinogenic)		7.30E-01	8.96E+01		1.10E-01	6.57E+05	8.96E+01
Naphthalene (non-carcinogenic)	2.00E-02		4.67E+04	3.00E-03		4.66E+03	4.24E+03
Naphthalene (carcinogenic)					3.40E-02	1.28E+03	1.28E+03
TOTAL PETROLEUM HYDROCARBONS							
Total Petroleum Hydrocarbons (non-carcinogenic)	4.00E-03		9.34E+03	3.00E-03		5.24E+03	3.36E+03
Total Petroleum Hydrocarbons (carcinogenic)							
POLYCHLORINATED BIPHENYLS							
PCBs - high risk (non-carcinogenic)							
PCBs - high risk (carcinogenic)		2.00E+00	3.27E+01		5.70E-01	1.27E+05	3.27E+01
VOLATILE ORGANIC COMPOUNDS							
Trichloroethene (non-carcinogenic)	5.00E-04		1.17E+03	2.00E-03		1.23E+02	1.11E+02
Trichloroethene (carcinogenic)		4.60E-02	1.42E+03		4.10E-03	4.19E+02	3.24E+02
Vinyl chloride (non-carcinogenic)	3.00E-03		7.01E+03	1.00E-01		1.76E+03	1.41E+03
Vinyl chloride (carcinogenic)		7.20E-01	9.08E+01		4.40E-03	1.12E+02	5.01E+01

Notes

Cells highlighted in **blue** are the lowest calculated soil remediation goal for that constituent.

NC - Not calculable. Dermal absorption factor not available.

RG - Soil cleanup goal

¹Soil Inhalation RG calculated using the particulate emission factor (PEF) for non-volatiles and the volatilization factor (VF) for volatiles; inhalation RG for TPH calculated using both the PEF and VF.

TABLE C-3 DERIVATION OF SOIL CLEANUP GOALS - CONSTRUCTION WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Exposure Pathway Soil Cleanup Goal Equations

Soil Ingestion RG (non-carcinogenic) = $\underline{\text{THQ} \times \text{BW} \times \text{ATn}}$

 $\mathsf{EF} \times \mathsf{ED} \times (\mathsf{1/RfDo}) \times \mathsf{IR} \times \mathsf{CF1}$

Soil Ingestion RG (carcinogenic) = $\underline{TR \times BW \times ATc}$

ED v CSEO v IB v CE1

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{CSFo} \times \mathsf{IR} \times \mathsf{CF1}$

Soil Dermal RG (non-carcinogenic) = $\underline{THQ \times BW \times ATn}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{1/(RfDo} \times \mathsf{GIABS)} \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Dermal RG (carcinogenic) =

 $TR \times BW \times ATc$

 $\mathsf{EF} \times \mathsf{ED} \times (\mathsf{CSFo}/\mathsf{GIABS}) \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Inhalation RG (non-carcinogenic) =

THQ × ATn

 $EF \times ED \times ET \times CF2 \times (1/RfC) \times (1/VF + 1/PEF)^{1}$

Soil Inhalation RG (carcinogenic) =

 $TR \times ATc$

Constituent of Potential Concern	Oral Reference Dose mg/kg-day	Oral Cancer Slope Factor (mg/kg-day) ⁻¹	Ingestion RG mg/kg	Oral Reference Dose (adjusted for gastrointestinal absorption) mg/kg-day	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption) (mg/kg-day) ⁻¹	Dermal RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m³) ⁻¹	Inhalation RG mg/kg	Soil RG (all pathways) mg/kg
INORGANICS										
Arsenic (non-carcinogenic)	3.00E-04		2.21E+02	3.00E-04		2.34E+03	1.50E-05		8.07E+04	2.02E+02
Arsenic (carcinogenic)		1.50E+00	3.44E+02		1.50E+00	3.64E+03		4.30E+00	8.76E+05	3.14E+02
Cadmium (non-carcinogenic)	1.00E-03		7.37E+02	2.50E-05		5.84E+03	1.00E-05		5.38E+04	7.27E+02
Cadmium (carcinogenic)								1.80E+00	2.09E+06	2.09E+06
Cobalt (non-carcinogenic)	3.00E-04		2.21E+02	3.00E-04		NC	6.00E-06		3.23E+04	2.20E+02
Cobalt (carcinogenic)								9.00E+00	4.18E+05	4.18E+05
Copper (non-carcinogenic)	4.00E-02		2.95E+04	4.00E-02		NC				2.95E+04
Copper (carcinogenic)			-						-	
Cyanide (non-carcinogenic)	6.00E-04		4.42E+02	6.00E-04		NC	8.00E-04		4.30E+06	4.42E+02
Cyanide (carcinogenic)										
Manganese (non-carcinogenic)	2.40E-02		1.77E+04	9.60E-04		NC	5.00E-05		2.69E+05	1.66E+04
Manganese (carcinogenic)										
Vanadium (non-carcinogenic)	5.00E-03		3.69E+03	1.30E-04		NC	1.00E-04		5.38E+05	3.66E+03
Vanadium (carcinogenic)										

TABLE C-3 DERIVATION OF SOIL CLEANUP GOALS - CONSTRUCTION WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Exposure Pathway Soil Cleanup Goal Equations

Soil Ingestion RG (non-carcinogenic) = $\underline{\text{THQ} \times \text{BW} \times \text{ATn}}$

 $\mathsf{EF} \times \mathsf{ED} \times (\mathsf{1/RfDo}) \times \mathsf{IR} \times \mathsf{CF1}$

Soil Ingestion RG (carcinogenic) = $\underline{TR \times BW \times ATc}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{CSFo} \times \mathsf{IR} \times \mathsf{CF1}$

Soil Dermal RG (non-carcinogenic) = $\underline{THQ \times BW \times ATn}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{1/(RfDo} \times \mathsf{GIABS)} \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Dermal RG (carcinogenic) = $\underline{TR \times BW \times ATc}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{(CSFo/GIABS)} \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Inhalation RG (non-carcinogenic) =

 $\frac{\text{THQ} \times \text{ATn}}{\text{EF} \times \text{ED} \times \text{ET} \times \text{CF2} \times (\text{1/RfC}) \times (\text{1/VF} + \text{1/PEF})^1}$

Soil Inhalation RG (carcinogenic) =

 $TR \times ATc$

Constituent of Potential Concern	Oral Reference Dose mg/kg-day	Oral Cancer Slope Factor (mg/kg-day) ⁻¹	Ingestion RG mg/kg	Oral Reference Dose (adjusted for gastrointestinal absorption) mg/kg-day	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption) (mg/kg-day) ⁻¹	Dermal RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m³) ⁻¹	Inhalation RG mg/kg	Soil RG (all pathways) mg/kg
POLYCYCLIC AROMATIC HYDROCARBONS										
Benzo(a)anthracene (non-carcinogenic)										
Benzo(a)anthracene (carcinogenic)		7.30E-01	7.07E+02		7.30E-01	1.72E+03		1.10E-01	3.42E+07	5.01E+02
Benzo(a)pyrene (non-carcinogenic)										
Benzo(a)pyrene (carcinogenic)		7.30E+00	7.07E+01		7.30E+00	1.72E+02		1.10E+00	3.42E+06	5.01E+01
Benzo(b)fluoranthene (non-carcinogenic)										
Benzo(b)fluoranthene (carcinogenic)		7.30E-01	7.07E+02		7.30E-01	1.72E+03		1.10E-01	3.42E+07	5.01E+02
Dibenz(a,h)anthracene (non-carcinogenic)										
Dibenz(a,h)anthracene (carcinogenic)		7.30E+00	7.07E+01		7.30E+00	1.72E+02		1.20E+00	3.14E+06	5.01E+01
Indeno(1,2,3-cd)pyrene (non-carcinogenic)										
Indeno(1,2,3-cd)pyrene (carcinogenic)		7.30E-01	7.07E+02		7.30E-01	1.72E+03		1.10E-01	3.42E+07	5.01E+02
Naphthalene (non-carcinogenic)	2.00E-02		1.47E+04	2.00E-02		3.60E+04	3.00E-03		1.94E+03	1.64E+03
Naphthalene (carcinogenic)								3.40E-02	1.33E+04	1.33E+04
TOTAL PETROLEUM HYDROCARBONS										
Total Petroleum Hydrocarbons (non-carcinogenic)	4.00E-03		2.95E+03	4.00E-03		NC	3.00E-03		2.18E+03	1.25E+03
Total Petroleum Hydrocarbons (carcinogenic)										

TABLE C-3 DERIVATION OF SOIL CLEANUP GOALS - CONSTRUCTION WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

	Exposure Pathway	Soil C	leanup Goal Equation	ons		
Soil Ingestio	on RG (non-carcinogenic) =	EF ×	$\frac{\text{THQ} \times \text{BW} \times \text{ATn}}{\text{ED} \times (1/\text{RfDo}) \times \text{IR} \times}$	CF1		
Soil Ing	gestion RG (carcinogenic) =	EF	$\frac{TR \times BW \times ATc}{ED \times CSFo \times IR \times C}$	CF1		
Soil Derm	aal RG (non-carcinogenic) =	$EF \times ED \times 1/(Rf$	$\frac{THQ \times BW \times ATn}{Do \times GIABS) \times SA \times A}$	AF imes ABS imes CF1		
Soil I	Dermal RG (carcinogenic) =	$EF \times ED \times (CS)$	<u>TR × BW × ATc</u> Fo/GIABS) × SA × AF	× ABS × CF1		
Soil Inhalatio	on RG (non-carcinogenic) =	$EF \times ED \times ET$	$\frac{\text{THQ} \times \text{ATn}}{\text{CF2} \times (\text{1/RfC}) \times (\text{1/PfC})}$	/VF + 1/PEF) ¹		
Soil Inha	alation RG (carcinogenic) =	$EF \times ED \times E$	$\frac{\text{TR} \times \text{ATc}}{\text{T} \times \text{CF2} \times \text{IUR} \times \text{(1/V)}}$	F + 1/PEF) ¹		
			Ovel Consensitence			

Constituent of Potential Concern	Oral Reference Dose mg/kg-day	Oral Cancer Slope Factor (mg/kg-day) ⁻¹	Ingestion RG mg/kg	Oral Reference Dose (adjusted for gastrointestinal absorption) mg/kg-day	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption) (mg/kg-day) ¹	Dermal RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m³) ⁻¹	Inhalation RG mg/kg	Soil RG (all pathways) mg/kg
POLYCHLORINATED BIPHENYLS										
PCBs - high risk (non-carcinogenic)										
PCBs - high risk (carcinogenic)		2.00E+00	2.58E+02		2.00E+00	5.84E+02		5.70E-01	6.61E+06	1.79E+02
VOLATILE ORGANIC COMPOUNDS										
Trichloroethene (non-carcinogenic)	5.00E-04		3.69E+02	5.00E-04		NC	2.00E-03		5.11E+01	4.49E+01
Trichloroethene (carcinogenic)		4.60E-02	1.12E+04		4.60E-02	NC		4.10E-03	4.36E+03	3.14E+03
Vinyl chloride (non-carcinogenic)	3.00E-03		2.21E+03	3.00E-03		NC	1.00E-01		7.33E+02	5.50E+02
Vinyl chloride (carcinogenic)		7.20E-01	7.17E+02		7.20E-01	NC		4.40E-03	1.17E+03	4.44E+02

Notes:

Cells highlighted in **blue** are the lowest calculated soil remediation goal for that constituent.

NC - Not calculable. Dermal absorption factor not available.

RG - Soil cleanup goal

¹Soil Inhalation RG calculated using the particulate emission factor (PEF) for non-volatiles and the volatilization factor (VF) for volatiles; inhalation RG for TPH calculated using both the PEF and VF.

TABLE C-4 DERIVATION OF SOIL CLEANUP GOALS - UTILITY WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Exposure Pathway

Soil Cleanup Goal Equations

Soil Ingestion RG (non-carcinogenic) =

THQ × BW × ATn

 $\mathsf{EF} \times \mathsf{ED} \times (\mathsf{1/RfDo}) \times \mathsf{IR} \times \mathsf{CF1}$

Soil Ingestion RG (carcinogenic) =

 $\frac{TR \times BW \times ATc}{EF \times ED \times CSFo \times IR \times CF1}$

Soil Dermal RG (non-carcinogenic) =

 $\underline{\mathsf{THQ} \times \mathsf{BW} \times \mathsf{ATn}}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{1/(RfDo} \times \mathsf{GIABS)} \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Dermal RG (carcinogenic) =

 $\underline{\mathsf{TR} \times \mathsf{BW} \times \mathsf{ATc}}$

 $\mathsf{EF} \times \mathsf{ED} \times (\mathsf{CSFo}/\mathsf{GIABS}) \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Inhalation RG (non-carcinogenic) =

 $THQ \times ATn$

 $EF \times ED \times ET \times CF2 \times (1/RfC) \times (1/VF + 1/PEF)^{1}$

Soil Inhalation RG (carcinogenic) =

 $\mathsf{TR} \times \mathsf{ATc}$

Constituent of Potential Concern	Oral Reference Dose mg/kg-day	Oral Cancer Slope Factor (mg/kg-day) ⁻¹	Ingestion RG mg/kg	Oral Reference Dose (adjusted for gastrointestinal absorption) mg/kg-day	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption) (mg/kg-day) ⁻¹	Dermal RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m³) ⁻¹	Inhalation RG mg/kg	Soil RG (all pathways) mg/kg
Arsenic (non-carcinogenic)	3.00E-04		3.65E+03	3.00E-04		1.75E+04	1.50E-05		4.03E+05	3.00E+03
Arsenic (carcinogenic)		1.50E+00	2.27E+02		1.50E+00	1.09E+03		4.30E+00	1.75E+05	1.88E+02
Cadmium (non-carcinogenic)	1.00E-03		1.22E+04	2.50E-05		4.38E+04	1.00E-05		2.69E+05	1.16E+04
Cadmium (carcinogenic)								1.80E+00	4.18E+05	4.18E+05
Cobalt (non-carcinogenic)	3.00E-04		3.65E+03	3.00E-04		NC	6.00E-06		1.61E+05	3.57E+03
Cobalt (carcinogenic)								9.00E+00	8.37E+04	8.37E+04
Copper (non-carcinogenic)	4.00E-02		4.87E+05	4.00E-02		NC				4.87E+05
Copper (carcinogenic)										
Cyanide (non-carcinogenic)	6.00E-04		7.30E+03	6.00E-04		NC	8.00E-04		2.15E+07	7.30E+03
Cyanide (carcinogenic)										
Manganese (non-carcinogenic)	2.40E-02		2.92E+05	9.60E-04		NC	5.00E-05		1.34E+06	2.40E+05
Manganese (carcinogenic)										
Nickel (non-carcinogenic)	2.00E-02		2.43E+05	8.00E-04		NC	9.00E-05		2.42E+06	2.21E+05
Nickel (carcinogenic)								2.60E-01	2.90E+06	2.90E+06
Vanadium (non-carcinogenic)	5.00E-03		6.08E+04	1.30E-04		NC	1.00E-04		2.69E+06	5.95E+04
Vanadium (carcinogenic)										

TABLE C-4 DERIVATION OF SOIL CLEANUP GOALS - UTILITY WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Exposure Pathway

Soil Cleanup Goal Equations

Soil Ingestion RG (non-carcinogenic) =

 $\frac{\mathsf{THQ} \times \mathsf{BW} \times \mathsf{ATn}}{\mathsf{CL}(\mathsf{BS})} = \mathsf{CL}(\mathsf{BS})$

 $\mathsf{EF} \times \mathsf{ED} \times (\mathsf{1/RfDo}) \times \mathsf{IR} \times \mathsf{CF1}$

Soil Ingestion RG (carcinogenic) =

 $\underline{\mathsf{TR}} \times \mathsf{BW} \times \mathsf{ATc}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{CSFo} \times \mathsf{IR} \times \mathsf{CF1}$

Soil Dermal RG (non-carcinogenic) =

 $\underline{\mathsf{THQ} \times \mathsf{BW} \times \mathsf{ATn}}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{1/(RfDo} \times \mathsf{GIABS)} \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Dermal RG (carcinogenic) =

 $TR \times BW \times ATc$

 $\mathsf{EF} \times \mathsf{ED} \times (\mathsf{CSFo}/\mathsf{GIABS}) \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Inhalation RG (non-carcinogenic) =

 $THQ \times ATn$

 $EF \times ED \times ET \times CF2 \times (1/RfC) \times (1/VF + 1/PEF)^{1}$

Soil Inhalation RG (carcinogenic) =

 $TR \times ATc$

Constituent of Potential Concern	Oral Reference Dose mg/kg-day	Oral Cancer Slope Factor (mg/kg-day) ⁻¹	Ingestion RG mg/kg	Oral Reference Dose (adjusted for gastrointestinal absorption) mg/kg-day	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption) (mg/kg-day) ⁻¹	Dermal RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m³) ⁻¹	Inhalation RG mg/kg	Soil RG (all pathways) mg/kg
POLYCYCLIC AROMATIC HYDROCARBONS										
Benzo(a)anthracene (non-carcinogenic)										
Benzo(a)anthracene (carcinogenic)		7.30E-01	4.67E+02		7.30E-01	5.17E+02		1.10E-01	6.85E+06	2.45E+02
Benzo(a)pyrene (non-carcinogenic)										
Benzo(a)pyrene (carcinogenic)		7.30E+00	4.67E+01		7.30E+00	5.17E+01		1.10E+00	6.85E+05	2.45E+01
Benzo(b)fluoranthene (non-carcinogenic)										
Benzo(b)fluoranthene (carcinogenic)		7.30E-01	4.67E+02		7.30E-01	5.17E+02		1.10E-01	6.85E+06	2.45E+02
Dibenz(a,h)anthracene (non-carcinogenic)										
Dibenz(a,h)anthracene (carcinogenic)		7.30E+00	4.67E+01		7.30E+00	5.17E+01		1.20E+00	6.28E+05	2.45E+01
Indeno(1,2,3-cd)pyrene (non-carcinogenic)										
Indeno(1,2,3-cd)pyrene (carcinogenic)		7.30E-01	4.67E+02		7.30E-01	5.17E+02		1.10E-01	6.85E+06	2.45E+02
Naphthalene (non-carcinogenic)	2.00E-02		2.43E+05	2.00E-02		2.70E+05	3.00E-03		4.86E+04	3.52E+04
Naphthalene (carcinogenic)								3.40E-02	1.33E+04	1.33E+04
TOTAL PETROLEUM HYDROCARBONS										
Total Petroleum Hydrocarbons (non-carcinogenic)	4.00E-03		4.87E+04	4.00E-03		NC	3.00E-03		5.45E+04	2.57E+04
Total Petroleum Hydrocarbons (carcinogenic)										

TABLE C-4 DERIVATION OF SOIL CLEANUP GOALS - UTILITY WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Exposure	Pathway	Soil (Cleanup Goal Equation	ons		
Soil Ingestion RG (non-	-carcinogenic) =		$\frac{\text{THQ} \times \text{BW} \times \text{ATn}}{\text{ED} \times (\text{1/RfDo}) \times \text{IR} \times}$	CF1		
Soil Ingestion RG	(carcinogenic) =		$\frac{\text{TR} \times \text{BW} \times \text{ATc}}{\text{ED} \times \text{CSFo} \times \text{IR} \times \text{C}}$	F1		
Soil Dermal RG (non-	-carcinogenic) =		$\frac{THQ \times BW \times ATn}{Do \times GIABS) \times SA \times A}$	AF imes ABS imes CF1		
Soil Dermal RG	(carcinogenic) =		$\frac{TR \times BW \times ATc}{Fo/GIABS) \times SA \times AF}$	× ABS × CF1		
Soil Inhalation RG (non-	-carcinogenic) =		$\frac{\text{THQ} \times \text{ATn}}{\times \text{CF2} \times (1/\text{RfC}) \times (1/\text{RfC})}$	/VF + 1/PEF) ¹		
Soil Inhalation RG	(carcinogenic) =		$\frac{TR \times ATc}{T \times CF2 \times IUR \times (1/V)}$	F + 1/PEF) ¹		
			0			

Constituent of Potential Concern	Oral Reference Dose mg/kg-day	Oral Cancer Slope Factor (mg/kg-day) ⁻¹	Ingestion RG mg/kg	Oral Reference Dose (adjusted for gastrointestinal absorption) mg/kg-day	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption) (mg/kg-day) ⁻¹	Dermal RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m³) ⁻¹	Inhalation RG mg/kg	Soil RG (all pathways) mg/kg
POLYCHLORINATED BIPHENYLS										
PCBs - high risk (non-carcinogenic)										
PCBs - high risk (carcinogenic)		2.00E+00	1.70E+02		2.00E+00	1.75E+02		5.70E-01	1.32E+06	8.64E+01
VOLATILE ORGANIC COMPOUNDS										
Trichloroethene (non-carcinogenic)	5.00E-04		6.08E+03	5.00E-04		NC	2.00E-03		1.28E+03	1.06E+03
Trichloroethene (carcinogenic)		4.60E-02	7.41E+03		4.60E-02	NC		4.10E-03	4.36E+03	2.75E+03
Vinyl chloride (non-carcinogenic)	3.00E-03		3.65E+04	3.00E-03		NC	1.00E-01		1.83E+04	1.22E+04
Vinyl chloride (carcinogenic)		7.20E-01	4.73E+02		7.20E-01	NC		4.40E-03	1.17E+03	3.37E+02

Notes:

Cells highlighted in **blue** are the lowest calculated soil remediation goal for that constituent.

NC - Not calculable. Dermal absorption factor not available.

RG - Soil cleanup goal

¹Soil Inhalation RG calculated using the particulate emission factor (PEF) for non-volatiles and the volatilization factor (VF) for volatiles; inhalation RG for TPH calculated using both the PEF and VF.

TABLE C-5 DERIVATION OF SOIL CLEANUP GOALS - OLDER CHILD TRESPASSER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Exposure Pathway Soil Cl

Soil Cleanup Goal Equations

Soil Ingestion RG (non-carcinogenic) =

 $\frac{\text{THQ} \times \text{BW} \times \text{ATn}}{\text{EF} \times \text{ED} \times (\text{1/RfDo}) \times \text{IR} \times \text{CF1}}$

` '

Soil Ingestion RG (carcinogenic) =

 $TR \times BW \times ATc$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{CSFo} \times \mathsf{IR} \times \mathsf{CF1}$

Soil Dermal RG (non-carcinogenic) =

 $\underline{\mathsf{THQ} \times \mathsf{BW} \times \mathsf{ATn}}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{1/(RfDo} \times \mathsf{GIABS)} \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Dermal RG (carcinogenic) =

 $\underline{\mathsf{TR}} \times \mathsf{BW} \times \mathsf{ATc}$

 $\mathsf{EF} \times \mathsf{ED} \times (\mathsf{CSFo}/\mathsf{GIABS}) \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Inhalation RG (non-carcinogenic) =

 $THQ \times ATn$

 $EF \times ED \times ET \times CF2 \times (1/RfC) \times (1/VF + 1/PEF)^{1}$

Soil Inhalation RG (carcinogenic) =

 $TR \times ATc$

Constituent of Potential Concern	Oral Reference Dose mg/kg-day	Oral Cancer Slope Factor (mg/kg-day) ⁻¹	Ingestion RG mg/kg	Oral Reference Dose (adjusted for gastrointestinal absorption) mg/kg-day	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption) (mg/kg-day) ⁻¹	Dermal RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m³) ⁻¹	Inhalation RG mg/kg	Surface Soil RG (all pathways) mg/kg
INORGANICS										
Arsenic (non-carcinogenic)	3.00E-04		7.97E+02	3.00E-04		7.83E+03	1.50E-05		2.48E+05	7.22E+02
Arsenic (carcinogenic)		1.50E+00	2.07E+02		1.50E+00	2.03E+03		4.30E+00	4.49E+05	1.88E+02
Cadmium (non-carcinogenic)	1.00E-03		2.66E+03	2.50E-05		1.96E+04	1.00E-05		1.65E+05	2.62E+03
Cadmium (carcinogenic)								1.80E+00	1.07E+06	1.07E+06
Cobalt (non-carcinogenic)	3.00E-04		7.97E+02	3.00E-04		NC	6.00E-06		9.93E+04	7.91E+02
Cobalt (carcinogenic)								9.00E+00	2.15E+05	2.15E+05
Copper (non-carcinogenic)	4.00E-02		1.06E+05	4.00E-02		NC				1.06E+05
Copper (carcinogenic)										
Cyanide (non-carcinogenic)	6.00E-04		1.59E+03	6.00E-04		NC	8.00E-04		1.32E+07	1.59E+03
Cyanide (carcinogenic)									-	
Manganese (non-carcinogenic)	2.40E-02		6.38E+04	9.60E-04		NC	5.00E-05		8.27E+05	5.92E+04
Manganese (carcinogenic)										
Vanadium (non-carcinogenic)	5.00E-03		1.33E+04	1.30E-04		NC	1.00E-04		1.65E+06	1.32E+04
Vanadium (carcinogenic)									-	

TABLE C-5 DERIVATION OF SOIL CLEANUP GOALS - OLDER CHILD TRESPASSER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Exposure Pathway Soil Cleanup Goal Equations

Soil Ingestion RG (non-carcinogenic) = $\underline{\text{THQ} \times \text{BW} \times \text{ATn}}$

 $\mathsf{EF} \times \mathsf{ED} \times (\mathsf{1/RfDo}) \times \mathsf{IR} \times \mathsf{CF1}$

Soil Ingestion RG (carcinogenic) = $\underline{TR \times BW \times ATc}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{CSFo} \times \mathsf{IR} \times \mathsf{CF1}$

Soil Dermal RG (non-carcinogenic) = $\underline{THQ \times BW \times ATn}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{1/(RfDo} \times \mathsf{GIABS)} \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Dermal RG (carcinogenic) = $\underline{TR \times BW \times ATc}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{(CSFo/GIABS)} \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Inhalation RG (non-carcinogenic) = <u>I</u>

 $\underline{\mathsf{THQ}} \times \mathsf{ATn}$

 $EF \times ED \times ET \times CF2 \times (1/RfC) \times (1/VF + 1/PEF)^{1}$

Soil Inhalation RG (carcinogenic) =

 $TR \times ATc$

Constituent of Potential Concern	Oral Reference Dose mg/kg-day	Oral Cancer Slope Factor (mg/kg-day) ⁻¹	Ingestion RG mg/kg	Oral Reference Dose (adjusted for gastrointestinal absorption) mg/kg-day	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption) (mg/kg-day) ¹	Dermal RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m³) ⁻¹	Inhalation RG mg/kg	Surface Soil RG (all pathways) mg/kg
POLYCYCLIC AROMATIC HYDROCARBONS										
Benzo(a)anthracene (non-carcinogenic)										
Benzo(a)anthracene (carcinogenic)		7.30E-01	4.25E+02		7.30E-01	9.63E+02		1.10E-01	1.76E+07	2.95E+02
Benzo(a)pyrene (non-carcinogenic)										
Benzo(a)pyrene (carcinogenic)		7.30E+00	4.25E+01		7.30E+00	9.63E+01		1.10E+00	1.76E+06	2.95E+01
Benzo(b)fluoranthene (non-carcinogenic)										
Benzo(b)fluoranthene (carcinogenic)		7.30E-01	4.25E+02		7.30E-01	9.63E+02		1.10E-01	1.76E+07	2.95E+02
Dibenz(a,h)anthracene (non-carcinogenic)										
Dibenz(a,h)anthracene (carcinogenic)		7.30E+00	4.25E+01		7.30E+00	9.63E+01		1.20E+00	1.61E+06	2.95E+01
Indeno(1,2,3-cd)pyrene (non-carcinogenic)										
Indeno(1,2,3-cd)pyrene (carcinogenic)		7.30E-01	4.25E+02		7.30E-01	9.63E+02		1.10E-01	1.76E+07	2.95E+02
Naphthalene (non-carcinogenic)	2.00E-02		5.32E+04	2.00E-02		1.20E+05	3.00E-03		2.99E+04	1.65E+04
Naphthalene (carcinogenic)						-		3.40E-02	3.42E+04	3.42E+04
TOTAL PETROLEUM HYDROCARBONS										
Total Petroleum Hydrocarbons (non-carcinogenic)	4.00E-03		1.06E+04	4.00E-03		NC	3.00E-03		3.36E+04	8.07E+03
Total Petroleum Hydrocarbons (carcinogenic)										

TABLE C-5 DERIVATION OF SOIL CLEANUP GOALS - OLDER CHILD TRESPASSER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

	Exposure Pathway	Soil C	leanup Goal Equation	ons		
Soil Ingestio	on RG (non-carcinogenic) =	EF ×	$\frac{\text{THQ} \times \text{BW} \times \text{ATn}}{\text{ED} \times (1/\text{RfDo}) \times \text{IR} \times}$	CF1		
Soil Ing	gestion RG (carcinogenic) =	EF	$\frac{TR \times BW \times ATc}{ED \times CSFo \times IR \times C}$	CF1		
Soil Derm	aal RG (non-carcinogenic) =	$EF \times ED \times 1/(Rf$	$\frac{THQ \times BW \times ATn}{Do \times GIABS) \times SA \times A}$	AF imes ABS imes CF1		
Soil I	Dermal RG (carcinogenic) =	$EF \times ED \times (CS)$	<u>TR × BW × ATc</u> Fo/GIABS) × SA × AF	× ABS × CF1		
Soil Inhalatio	on RG (non-carcinogenic) =	$EF \times ED \times ET$	$\frac{\text{THQ} \times \text{ATn}}{\text{CF2} \times (\text{1/RfC}) \times (\text{1/PfC})}$	/VF + 1/PEF) ¹		
Soil Inha	alation RG (carcinogenic) =	$EF \times ED \times E$	$\frac{\text{TR} \times \text{ATc}}{\text{T} \times \text{CF2} \times \text{IUR} \times \text{(1/V)}}$	F + 1/PEF) ¹		
			Ovel Consensitence			

	Oral Reference Dose	Oral Cancer Slope Factor	Ingestion RG	Oral Reference Dose (adjusted for gastrointestinal absorption)	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption)	Dermal RG	Inhalation Reference Concentration	Inhalation Unit Risk	Inhalation RG	Surface Soil RG (all pathways)
Constituent of Potential Concern	mg/kg-day	(mg/kg-day) ⁻¹	mg/kg	mg/kg-day	(mg/kg-day) ⁻¹	mg/kg	mg/m ³	(mg/m ³) ⁻¹	mg/kg	mg/kg
POLYCHLORINATED BIPHENYLS				·						
PCBs - high risk (non-carcinogenic)										
PCBs - high risk (carcinogenic)		2.00E+00	1.55E+02		2.00E+00	3.26E+02		5.70E-01	3.39E+06	1.05E+02
VOLATILE ORGANIC COMPOUNDS	-	-	-	_					-	
Trichloroethene (non-carcinogenic)	5.00E-04		1.33E+03	5.00E-04		NC	2.00E-03		7.86E+02	4.94E+02
Trichloroethene (carcinogenic)		4.60E-02	6.74E+03		4.60E-02	NC		4.10E-03	1.12E+04	4.21E+03
Vinyl chloride (non-carcinogenic)	3.00E-03		7.97E+03	3.00E-03		NC	1.00E-01		1.13E+04	4.67E+03
Vinyl chloride (carcinogenic)		7.20E-01	4.31E+02		7.20E-01	NC		4.40E-03	2.99E+03	3.76E+02

Notes:

Cells highlighted in **blue** are the lowest calculated soil remediation goal for that constituent.

NC - Not calculable. Dermal absorption factor not available.

RG - Soil cleanup goal

¹Soil Inhalation RG calculated using the particulate emission factor (PEF) for non-volatiles and the volatilization factor (VF) for volatiles; inhalation RG for TPH calculated using both the PEF and VF.

TABLE C-6 DERIVATION OF SOIL CLEANUP GOALS - ADULT TRESPASSER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Exposure Pathway

Soil Cleanup Goal Equations

Soil Ingestion RG (non-carcinogenic) =

 $\underline{\mathsf{THQ} \times \mathsf{BW} \times \mathsf{ATn}}$

 $\mathsf{EF} \times \mathsf{ED} \times (\mathsf{1/RfDo}) \times \mathsf{IR} \times \mathsf{CF1}$

Soil Ingestion RG (carcinogenic) =

 $TR \times BW \times ATc$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{CSFo} \times \mathsf{IR} \times \mathsf{CF1}$

Soil Dermal RG (non-carcinogenic) =

 $\underline{\mathsf{THQ} \times \mathsf{BW} \times \mathsf{ATn}}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{1/(RfDo} \times \mathsf{GIABS)} \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Dermal RG (carcinogenic) =

 $\underline{\mathsf{TR} \times \mathsf{BW} \times \mathsf{ATc}}$

 $\mathsf{EF} \times \mathsf{ED} \times (\mathsf{CSFo}/\mathsf{GIABS}) \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Inhalation RG (non-carcinogenic) =

THQ × ATn

 $EF \times ED \times ET \times CF2 \times (1/RfC) \times (1/VF + 1/PEF)^{1}$

Soil Inhalation RG (carcinogenic) =

 $TR \times ATc$

Constituent of Potential Concern	Oral Reference Dose mg/kg-day	Oral Cancer Slope Factor (mg/kg-day) ⁻¹	Ingestion RG mg/kg	Oral Reference Dose (adjusted for gastrointestinal absorption) mg/kg-day	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption) (mg/kg-day) ⁻¹	Dermal RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m³) ⁻¹	Inhalation RG mg/kg	Surface Soil RG (all pathways) mg/kg
INORGANICS										
Arsenic (non-carcinogenic)	3.00E-04		1.12E+03	3.00E-04		8.87E+03	1.50E-05		2.48E+05	9.93E+02
Arsenic (carcinogenic)		1.50E+00	6.99E+01		1.50E+00	5.52E+02		4.30E+00	1.08E+05	6.20E+01
Cadmium (non-carcinogenic)	1.00E-03		3.74E+03	2.50E-05		2.22E+04	1.00E-05		1.65E+05	3.66E+03
Cadmium (carcinogenic)								1.80E+00	2.57E+05	2.57E+05
Cobalt (non-carcinogenic)	3.00E-04		1.12E+03	3.00E-04		NC	6.00E-06		9.93E+04	1.11E+03
Cobalt (carcinogenic)								9.00E+00	5.15E+04	5.15E+04
Copper (non-carcinogenic)	4.00E-02		1.50E+05	4.00E-02		NC				1.50E+05
Copper (carcinogenic)									-	
Cyanide (non-carcinogenic)	6.00E-04		2.25E+03	6.00E-04		NC	8.00E-04		1.32E+07	2.25E+03
Cyanide (carcinogenic)									-	
Manganese (non-carcinogenic)	2.40E-02		8.98E+04	9.60E-04		NC	5.00E-05		8.27E+05	8.10E+04
Manganese (carcinogenic)										
Vanadium (non-carcinogenic)	5.00E-03		1.87E+04	1.30E-04		NC	1.00E-04		1.65E+06	1.85E+04
Vanadium (carcinogenic)										

TABLE C-6 DERIVATION OF SOIL CLEANUP GOALS - ADULT TRESPASSER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Exposure Pathway Soil Cleanup Goal Equations

Soil Ingestion RG (non-carcinogenic) = $\underline{\text{THQ} \times \text{BW} \times \text{ATn}}$

 $\mathsf{EF} \times \mathsf{ED} \times (\mathsf{1/RfDo}) \times \mathsf{IR} \times \mathsf{CF1}$

Soil Ingestion RG (carcinogenic) = $\underline{TR \times BW \times ATc}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{CSFo} \times \mathsf{IR} \times \mathsf{CF1}$

Soil Dermal RG (non-carcinogenic) = $\underline{THQ \times BW \times ATn}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{1/(RfDo} \times \mathsf{GIABS)} \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Dermal RG (carcinogenic) = $\underline{TR \times BW \times ATc}$

 $\mathsf{EF} \times \mathsf{ED} \times \mathsf{(CSFo/GIABS)} \times \mathsf{SA} \times \mathsf{AF} \times \mathsf{ABS} \times \mathsf{CF1}$

Soil Inhalation RG (non-carcinogenic) = $\underline{\text{THQ} \times \text{ATn}}$

 $EF \times ED \times ET \times CF2 \times (1/RfC) \times (1/VF + 1/PEF)^{1}$

Soil Inhalation RG (carcinogenic) = $\underline{TR \times ATc}$

Constituent of Potential Concern	Oral Reference Dose mg/kg-day	Oral Cancer Slope Factor (mg/kg-day) ⁻¹	Ingestion RG mg/kg	Oral Reference Dose (adjusted for gastrointestinal absorption) mg/kg-day	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption) (mg/kg-day) ⁻¹	Dermal RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m³) ⁻¹	Inhalation RG mg/kg	Surface Soil RG (all pathways) mg/kg
POLYCYCLIC AROMATIC HYDROCARBONS										
Benzo(a)anthracene (non-carcinogenic)										
Benzo(a)anthracene (carcinogenic)		7.30E-01	1.44E+02		7.30E-01	2.62E+02		1.10E-01	4.21E+06	9.27E+01
Benzo(a)pyrene (non-carcinogenic)										
Benzo(a)pyrene (carcinogenic)		7.30E+00	1.44E+01		7.30E+00	2.62E+01		1.10E+00	4.21E+05	9.27E+00
Benzo(b)fluoranthene (non-carcinogenic)										
Benzo(b)fluoranthene (carcinogenic)		7.30E-01	1.44E+02		7.30E-01	2.62E+02		1.10E-01	4.21E+06	9.27E+01
Dibenz(a,h)anthracene (non-carcinogenic)										
Dibenz(a,h)anthracene (carcinogenic)		7.30E+00	1.44E+01		7.30E+00	2.62E+01		1.20E+00	3.86E+05	9.27E+00
Indeno(1,2,3-cd)pyrene (non-carcinogenic)										
Indeno(1,2,3-cd)pyrene (carcinogenic)		7.30E-01	1.44E+02		7.30E-01	2.62E+02		1.10E-01	4.21E+06	9.27E+01
Naphthalene (non-carcinogenic)	2.00E-02		7.49E+04	2.00E-02		1.36E+05	3.00E-03		2.99E+04	1.85E+04
Naphthalene (carcinogenic)								3.40E-02	8.21E+03	8.21E+03
TOTAL PETROLEUM HYDROCARBONS										
Total Petroleum Hydrocarbons (non-carcinogenic)	4.00E-03		1.50E+04	4.00E-03		NC	3.00E-03		3.36E+04	1.04E+04
Total Petroleum Hydrocarbons (carcinogenic)										

TABLE C-6 DERIVATION OF SOIL CLEANUP GOALS - ADULT TRESPASSER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

	Exposure	Pathway	Soil (Cleanup Goal Equation	ons			-
Soil Inge	stion RG (non-	-carcinogenic) =		$\frac{\text{THQ} \times \text{BW} \times \text{ATn}}{\text{ED} \times (1/\text{RfDo}) \times \text{IR} \times (1/\text{RfDo})}$	CF1			
Soil	Ingestion RG ((carcinogenic) =		$\frac{\text{TR} \times \text{BW} \times \text{ATc}}{\times \text{ED} \times \text{CSFo} \times \text{IR} \times \text{C}}$	CF1			
Soil De	rmal RG (non-	-carcinogenic) =		$\frac{\text{THQ} \times \text{BW} \times \text{ATn}}{\text{Do} \times \text{GIABS}) \times \text{SA} \times}$	$AF \times ABS \times CF1$			
Sc	oil Dermal RG ((carcinogenic) =		$TR \times BW \times ATC$ Fo/GIABS) × SA × AF	× ABS × CF1			
Soil Inhala	ation RG (non-	-carcinogenic) =		$\frac{\text{THQ} \times \text{ATn}}{\times \text{CF2} \times (1/\text{RfC}) \times (1/\text{RfC})}$	/VF + 1/PEF) ¹			
Soil I	nhalation RG ((carcinogenic) =		$\frac{TR \times ATC}{T \times CF2 \times IUR \times (1/V)}$	/F + 1/PEF) ¹			
la é	Oral Cancor		Oral Reference Dose (adjusted for	Oral Cancer Slope Factor (adjusted for		Inhalation	Inhalation Unit	

Constituent of Potential Concern	Oral Reference Dose mg/kg-day	Oral Cancer Slope Factor (mg/kg-day) ⁻¹	Ingestion RG mg/kg	Oral Reference Dose (adjusted for gastrointestinal absorption) mg/kg-day	Oral Cancer Slope Factor (adjusted for gastrointestinal absorption) (mg/kg-day) ¹	Dermal RG mg/kg	Inhalation Reference Concentration mg/m ³	Inhalation Unit Risk (mg/m³) ⁻¹	Inhalation RG mg/kg	Surface Soil RG (all pathways) mg/kg
POLYCHLORINATED BIPHENYLS										
PCBs - high risk (non-carcinogenic)										
PCBs - high risk (carcinogenic)		2.00E+00	5.24E+01		2.00E+00	8.87E+01		5.70E-01	8.13E+05	3.29E+01
VOLATILE ORGANIC COMPOUNDS										
Trichloroethene (non-carcinogenic)	5.00E-04		1.87E+03	5.00E-04		NC	2.00E-03		7.86E+02	5.54E+02
Trichloroethene (carcinogenic)		4.60E-02	2.28E+03		4.60E-02	NC		4.10E-03	2.69E+03	1.23E+03
Vinyl chloride (non-carcinogenic)	3.00E-03		1.12E+04	3.00E-03		NC	1.00E-01		1.13E+04	5.63E+03
Vinyl chloride (carcinogenic)		7.20E-01	1.46E+02		7.20E-01	NC		4.40E-03	7.17E+02	1.21E+02

Notes:

Cells highlighted in **blue** are the lowest calculated soil remediation goal for that constituent.

NC - Not calculable. Dermal absorption factor not available.

RG - Soil cleanup goal

¹Soil Inhalation RG calculated using the particulate emission factor (PEF) for non-volatiles and the volatilization factor (VF) for volatiles; inhalation RG for TPH calculated using both the PEF and VF.

TABLE C-7 INPUT PARAMETERS FOR ESTIMATING SOIL CLEANUP GOALS - OUTDOOR INDUSTRIAL WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Parameter	Value	Units	Reference
	_		
THQ - Target hazard quotient =	1	unitless	
TR - Target risk =	1E-05	unitless	
RfC - Reference concentration =	chemical-specific	mg/m ³	USEPA 2016
RfDo - Oral reference dose =	chemical-specific	mg/kg-day	USEPA 2016
CSFo - Oral cancer slope factor =	chemical-specific		⁻¹ USEPA 2016
IUR - Inhalation unit risk =	chemical-specific	$(mg/m^3)^{-1}$	USEPA 2016
BW - Body weight =	80	kg	USEPA 2014
ATn - Averaging time (noncarcinogens) =	9125	days	USEPA 2014
ATc - Averaging time (carcinogens) =	25550	years	USEPA 2014
ABS - Dermal absorption factor (arsenic) =	0.03	unitless	USEPA 2004
ABS - Dermal absorption factor (cadmium) =	0.001	unitless	USEPA 2004
ABS - Dermal absorption factor (PAHs) =	0.13	unitless	USEPA 2004
ABS - Dermal absorption factor (PCBs) =	0.14	unitless	USEPA 2004
EF - Exposure frequency =	225	days/year	USEPA 2014
ED - Exposure duration =	25	years	USEPA 2014
ET - Exposure time =	8	hours/day	USEPA 2014
GIABS - Gastrointestinal absorption factor (cadmium) =	0.025	unitless	USEPA 2004
GIABS - Gastrointestinal absorption factor (vanadium) =	0.026	unitless	USEPA 2004
GIABS - Gastrointestinal absorption factor (other chems) =	1	unitless	USEPA 2004
IR - Soil ingestion rate =	100	mg/day	USEPA 2014
AF - Soil to skin adherence factor =	0.12	mg/cm ²	USEPA 2014
PEF - Particulate emissions factor =	5.89E+08	m³/kg	USEPA 2002; site-specific (Table C-13)
SA - Skin surface area available for exposure =	3470	cm ² /day	USEPA 2014
VF - Soil-air volatilization factor (naphthalene) =	3.55E+05	m³/kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (TCE) =	1.40E+04	m³/kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (TPH) =	3.99E+05	m ³ /kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (vinyl chloride) =	4.01E+03	m ³ /kg	USEPA 2002; site-specific (Table C-16)
CF1 - Converstion factor =	0.000001	kg/mg	Unit conversion
CF2 - Converstion factor =	0.042	days/hour	Unit conversion

- USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355-24.4. Office of Solid Waste and Emergency Response. Washington, D.C. December 2002.
- USEPA. 2004. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final. EPA/540/R/99/005. Office of Superfund Remediation and Technology Innovation. Washington, D.C. July 2004.
- USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. Office of Solid Waste and Emergency Response. Washington, D.C. February 6, 2014.
- USEPA. 2016. Regional Screening Level (RSL) Summary Table. https://www.epa.gov/sites/production/files/2016-06/documents/master_sl_table_run_may2016.pdf.

TABLE C-8 INPUT PARAMETERS FOR ESTIMATING SOIL CLEANUP GOALS - INDOOR INDUSTRIAL WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Parameter	Value	Units	Reference
THQ - Target hazard quotient =	1	unitless	
TR - Target risk =	1E-05	unitless	
RfC - Reference concentration =	chemical-specific	mg/m ³	USEPA 2016
RfDo - Oral reference dose =	chemical-specific	mg/kg-day	USEPA 2016
CSFo - Oral cancer slope factor =	chemical-specific	(mg/kg-day) ⁻¹	USEPA 2016
IUR - Inhalation unit risk =	chemical-specific	$(mg/m^3)^{-1}$	USEPA 2016
BW - Body weight =	80	kg	USEPA 2014
ATn - Averaging time (noncarcinogens) =	9125	days	USEPA 2014
ATc - Averaging time (carcinogens) =	25550	years	USEPA 2014
EF - Exposure frequency =	250	days/year	USEPA 2014
ED - Exposure duration =	25	years	USEPA 2014
ET - Exposure time =	8	hours/day	USEPA 2014
IR - Soil ingestion rate =	50	mg/day	USEPA 2014
PEF - Particulate emissions factor =	5.89E+08	m³/kg	USEPA 2002; site-specific (Table C-13)
VF - Soil-air volatilization factor (naphthalene) =	3.55E+05	m³/kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (TCE) =	1.40E+04	m³/kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (TPH) =	3.99E+05	m ³ /kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (vinyl chloride) =	4.01E+03	m³/kg	USEPA 2002; site-specific (Table C-16)
CF1 - Converstion factor =	0.000001	kg/mg	Unit conversion
CF2 - Converstion factor =	0.042	days/hour	Unit conversion

- USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355-24.4. Office of Solid Waste and Emergency Response. Washington, D.C. December 2002.
- USEPA. 2004. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final. EPA/540/R/99/005. Office of Superfund Remediation and Technology Innovation. Washington, D.C. July 2004.
- USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. Office of Solid Waste and Emergency Response. Washington, D.C. February 6, 2014.
- USEPA. 2016. Regional Screening Level (RSL) Summary Table. https://www.epa.gov/sites/production/files/2016-06/documents/master_sl_table_run_may2016.pdf.

TABLE C-9 INPUT PARAMETERS FOR ESTIMATING SOIL CLEANUP GOALS - CONSTRUCTION WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Parameter	Value	Units	Reference
THQ - Target hazard quotient =	1	unitless	
TR - Target risk =	1E-05	unitless	
RfC - Reference concentration =		mg/m ³	USEPA 2016
RfDo - Oral reference dose =	chemical-specific chemical-specific	mg/kg-day	USEPA 2016
	•	_	
CSFo - Oral cancer slope factor =	chemical-specific	(mg/kg-day) ⁻¹	
IUR - Inhalation unit risk =	chemical-specific	(mg/m ³) ⁻¹	USEPA 2016
BW - Body weight =	80	kg	USEPA 2014
ATn - Averaging time (noncarcinogens) =	365	days	USEPA 2014
ATc - Averaging time (carcinogens) =	25550	years	USEPA 2014
ABS - Dermal absorption factor (arsenic) =	0.03	unitless	USEPA 2004
ABS - Dermal absorption factor (cadmium) =	0.001	unitless	USEPA 2004
ABS - Dermal absorption factor (PAHs) =	0.13	unitless	USEPA 2004
ABS - Dermal absorption factor (PCBs) =	0.14	unitless	USEPA 2004
EF - Exposure frequency =	120	days/year	Best professional judgment
ED - Exposure duration =	1	years	Best professional judgment
ET - Exposure time =	8	hours/day	USEPA 2014
GIABS - Gastrointestinal absorption factor (cadmium) =	0.025	unitless	USEPA 2004
GIABS - Gastrointestinal absorption factor (vanadium) =	0.026	unitless	USEPA 2004
GIABS - Gastrointestinal absorption factor (other chems) =	1	unitless	USEPA 2004
IR - Soil ingestion rate =	330	mg/day	USEPA 2002
AF - Soil to skin adherence factor =	0.3	mg/cm ²	USEPA 2004
PEF - Particulate emissions factor =	5.89E+08	m³/kg	USEPA 2002; site-specific (Table C-13)
SA - Skin surface area available for exposure =	3470	cm²/day	USEPA 2014
VF - Soil-air volatilization factor (naphthalene) =	7.10E+04	m ³ /kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (TCE) =	2.80E+03	m ³ /kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (TPH) =	7.98E+04	m³/kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (vinyl chloride) =	8.03E+02	m ³ /kg	USEPA 2002; site-specific (Table C-16)
CF1 - Converstion factor =	0.000001	kg/mg	Unit conversion
CF2 - Converstion factor =	0.042	days/hour	Unit conversion

References:

USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355-24.4. Office of Solid Waste and Emergency Response. Washington, D.C. December 2002.

USEPA. 2004. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final. EPA/540/R/99/005. Office of Superfund Remediation and Technology Innovation. Washington, D.C. July 2004.

USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. Office of Solid Waste and Emergency Response. Washington, D.C. February 6, 2014.

USEPA. 2016. Regional Screening Level (RSL) Summary Table. https://www.epa.gov/sites/production/files/2016-06/documents/master_sl_table_run_may2016.pdf.

TABLE C-10 INPUT PARAMETERS FOR ESTIMATING SOIL CLEANUP GOALS - UTILITY WORKER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

		Reference
1	nitlaga	
		LICEDA 201C
•		USEPA 2016
•		USEPA 2016
·		
· ·		USEPA 2016
		USEPA 2014
	•	USEPA 2014
	•	USEPA 2014
		USEPA 2004
		Best professional judgment
	•	USEPA 2014
_		USEPA 2014
****		USEPA 2004
		USEPA 2004
_		USEPA 2004
		USEPA 2014
0.2	•	USEPA 2004
5.89E+08	m³/kg	USEPA 2002; site-specific (Table C-13)
3470	cm ² /day	USEPA 2014
3.55E+05	m³/kg	USEPA 2002; site-specific (Table C-16)
1.40E+04	m ³ /kg	USEPA 2002; site-specific (Table C-16)
3.99E+05	m³/kg	USEPA 2002; site-specific (Table C-16)
4.01E+03	m ³ /kg	USEPA 2002; site-specific (Table C-16)
0.000001	kg/mg	Unit conversion
0.042	days/hour	Unit conversion
	3470 3.55E+05 1.40E+04 3.99E+05 4.01E+03 0.000001	1E-05 unitless chemical-specific mg/m³ chemical-specific mg/kg-day chemical-specific (mg/kg-day)⁻¹ chemical-specific (mg/m³)⁻¹ 80 kg 9125 days 25550 years 0.03 unitless 0.001 unitless 0.14 unitless 24 days/year 25 years 8 hours/day 0.025 unitless 0.026 unitless 1 unitless 100 mg/day 0.2 mg/cm² 5.89E+08 m³/kg 3470 cm²/day 3.55E+05 m³/kg 1.40E+04 m³/kg 3.99E+05 m³/kg 4.01E+03 m³/kg 0.000001 kg/mg

- USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355-24.4. Office of Solid Waste and Emergency Response. Washington, D.C. December 2002.
- USEPA. 2004. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final. EPA/540/R/99/005. Office of Superfund Remediation and Technology Innovation. Washington, D.C. July 2004.
- USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. Office of Solid Waste and Emergency Response. Washington, D.C. February 6, 2014.
- USEPA. 2016. Regional Screening Level (RSL) Summary Table. https://www.epa.gov/sites/production/files/2016-06/documents/master_sl_table_run_may2016.pdf.

TABLE C-11 INPUT PARAMETERS FOR ESTIMATING SOIL CLEANUP GOALS - OLDER CHILD TRESPASSER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Parameter	Value	Units	Reference
THQ - Target hazard quotient =	1	unitless	
TR - Target risk =	1E-05	unitless	
RfC - Reference concentration =		mg/m ³	USEPA 2016
RfDo - Oral reference dose =	chemical-specific chemical-specific	mg/kg-day	USEPA 2016
	·-	_	
CSFo - Oral cancer slope factor =	chemical-specific	(mg/kg-day) ⁻¹	
IUR - Inhalation unit risk =	chemical-specific	(mg/m ³) ⁻¹	USEPA 2016
BW - Body weight =	56.8	kg	USEPA 2011
ATn - Averaging time (noncarcinogens) =	2190	days	USEPA 2014
ATc - Averaging time (carcinogens) =	25550	years	USEPA 2014
ABS - Dermal absorption factor (arsenic) =	0.03	unitless	USEPA 2004
ABS - Dermal absorption factor (cadmium) =	0.001	unitless	USEPA 2004
ABS - Dermal absorption factor (PAHs) =	0.13	unitless	USEPA 2004
ABS - Dermal absorption factor (PCBs) =	0.14	unitless	USEPA 2004
EF - Exposure frequency =	78	days/year	Best professional judgment
ED - Exposure duration =	6	years	Receptor-specific
ET - Exposure time =	4	hours/day	Best professional judgment
GIABS - Gastrointestinal absorption factor (cadmium) =	0.025	unitless	USEPA 2004
GIABS - Gastrointestinal absorption factor (vanadium) =	0.026	unitless	USEPA 2004
GIABS - Gastrointestinal absorption factor (other chems) =	1	unitless	USEPA 2004
IR - Soil ingestion rate =	100	mg/day	USEPA 2014
AF - Soil to skin adherence factor =	0.07	mg/cm ²	USEPA 2014
PEF - Particulate emissions factor =	5.89E+08	m³/kg	USEPA 2002; site-specific (Table C-13)
SA - Skin surface area available for exposure =	4849	cm²/day	USEPA 2004
VF - Soil-air volatilization factor (naphthalene) =	3.55E+05	m ³ /kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (TCE) =	1.40E+04	m ³ /kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (TPH) =	3.99E+05	m³/kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (vinyl chloride) =	4.01E+03	m ³ /kg	USEPA 2002; site-specific (Table C-16)
CF1 - Converstion factor =	0.000001	kg/mg	Unit conversion
CF2 - Converstion factor =	0.042	days/hour	Unit conversion
CF2 - Converstion factor =	0.042	days/hour	Unit conversion

- USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355-24.4. Office of Solid Waste and Emergency Response. Washington, D.C. December 2002.
- USEPA. 2004. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final. EPA/540/R/99/005. Office of Superfund Remediation and Technology Innovation. Washington, D.C. July 2004.
- USEPA. 2011. Exposure Factors Handbook: 2011 Edition. EPA/600/R-090/052F. Office of Research and Development. Washington, D.C. September 2011.
- USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. Office of Solid Waste and Emergency Response. Washington, D.C. February 6, 2014.
- USEPA. 2016. Regional Screening Level (RSL) Summary Table. https://www.epa.gov/sites/production/files/2016-06/documents/master_sl_table_run_may2016.pdf.

TABLE C-12 INPUT PARAMETERS FOR ESTIMATING SOIL CLEANUP GOALS - ADULT TRESPASSER GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Parameter	Value	Units	Reference
THQ - Target hazard quotient =	1	unitless	
TR - Target risk =	1E-05	unitless	
RfC - Reference concentration =	chemical-specific	mg/m ³	USEPA 2016
RfDo - Oral reference dose =	chemical-specific	mg/kg-day	USEPA 2016
	•	(mg/kg-day) ⁻¹	
CSFo - Oral cancer slope factor =	chemical-specific		
IUR - Inhalation unit risk =	chemical-specific	(mg/m ³) ⁻¹	USEPA 2016
BW - Body weight =	80	kg	USEPA 2014
ATn - Averaging time (noncarcinogens) =	9125	days	USEPA 2014
ATc - Averaging time (carcinogens) =	25550	years	USEPA 2014
ABS - Dermal absorption factor (arsenic) =	0.03	unitless	USEPA 2004
ABS - Dermal absorption factor (cadmium) =	0.001	unitless	USEPA 2004
ABS - Dermal absorption factor (PAHs) =	0.13	unitless	USEPA 2004
ABS - Dermal absorption factor (PCBs) =	0.14	unitless	USEPA 2004
EF - Exposure frequency =	78	days/year	Best professional judgment
ED - Exposure duration =	25	years	Best professional judgment
ET - Exposure time =	4	hours/day	Best professional judgment
GIABS - Gastrointestinal absorption factor (cadmium) =	0.025	unitless	USEPA 2004
GIABS - Gastrointestinal absorption factor (vanadium) =	0.026	unitless	USEPA 2004
GIABS - Gastrointestinal absorption factor (other chems) =	1	unitless	USEPA 2004
IR - Soil ingestion rate =	100	mg/day	USEPA 2014
AF - Soil to skin adherence factor =	0.07	mg/cm ²	USEPA 2014
PEF - Particulate emissions factor =	5.89E+08	m³/kg	USEPA 2002; site-specific (Table C-13)
SA - Skin surface area available for exposure =	6032	cm²/day	USEPA 2014
VF - Soil-air volatilization factor (naphthalene) =	3.55E+05	m³/kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (TCE) =	1.40E+04	m³/kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (TPH) =	3.99E+05	m³/kg	USEPA 2002; site-specific (Table C-16)
VF - Soil-air volatilization factor (vinyl chloride) =	4.01E+03	m ³ /kg	USEPA 2002; site-specific (Table C-16)
CF1 - Converstion factor =	0.000001	kg/mg	Unit conversion
CF2 - Converstion factor =	0.042	days/hour	Unit conversion

- USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355-24.4. Office of Solid Waste and Emergency Response. Washington, D.C. December 2002.
- USEPA. 2004. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final. EPA/540/R/99/005. Office of Superfund Remediation and Technology Innovation. Washington, D.C. July 2004.
- USEPA. 2011. Exposure Factors Handbook: 2011 Edition. EPA/600/R-090/052F. Office of Research and Development. Washington, D.C. September 2011.
- USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. Office of Solid Waste and Emergency Response. Washington, D.C. February 6, 2014.
- USEPA. 2016. Regional Screening Level (RSL) Summary Table. https://www.epa.gov/sites/production/files/2016-06/documents/master_sl_table_run_may2016.pdf.

TABLE C-13 PARTICULATE EMISSIONS FACTOR CALCULATIONS GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Q/C wind = A × exp
$$\left[\frac{(InA_s - B)^2}{C}\right]$$

Equation 5-6, USEPA 2002

Variable	Value	Units	Rationale
A =	12.8612	unitless	unitless, Cleveland, OH Zone VII values, Exhibit D-2, USEPA 2002
B =	20.5164	unitless	unitless, Cleveland, OH Zone VII values, Exhibit D-2, USEPA 2002
C =	237.2798	unitless	unitless, Cleveland, OH Zone VII values, Exhibit D-2, USEPA 2002
A _{s Site} =	51.2	acres	Areal extent of potentially affected soil

$$Q/C_{wind} = 41.0 g/m^2-s per kg/m^3$$

$$PEF_{wind} = Q/C_{wind} \times \frac{3600s/h}{0.036 \times (1 - V) \times (U_m/U_t)^3 \times F(x)}$$

Equation 4-5, USEPA 2002

Variable	Value	Units	Rationale
U _m =	4.02	m/s	Mean annual windspeed (Current Results 2015)
U _t =	11.32	m/s	Threshold windspeed at 7m (USEPA 2002)
F(x) =	0.194	unitless	Function dependent on U _m /U _t (USEPA 2002)
V =	0.20	unitless	Fraction of vegetative cover (estimated)

$$PEF = 5.89E + 08 m3/kg$$

References:

USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December 2002. Current Results. 2015. Annual Average Wind Speed in U.S. Cities - Cincinnati, Ohio.

TABLE C-14 SOIL-TO-AIR VOLATILIZATION FACTORS - Q/C_{vol} CALCULATION GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Area	Receptor(s)	Area (acres)	Q/C _{vol (g/m -s per kg/m)} 3
Evendale Site	Utility Worker, Construction Worker, Industrial Worker	51.2	41.0



Exhibit D-3, USEPA 2002

<u>Variable</u>	<u>Value</u>	<u>Units/Rationale/Source</u>
A =	12.8612	unitless, Cleveland, OH Zone VII values, Exhibit D-3, USEPA 2002
B =	20.5164	unitless, Cleveland, OH Zone VII values, Exhibit D-3, USEPA 2002
C =	237.2798	unitless, Cleveland, OH Zone VII values, Exhibit D-3, USEPA 2002

Reference:

USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. Office of Solid Waste and Emergency Response. OSWER 9355.4-24. December 2002.

TABLE C-15 SOIL-TO-AIR VOLATILIZATION FACTORS - APPARENT DIFFUSIVITY CALCULATIONS GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

Parameter	Units	Value	Source
Soil Particle Density	(g/cm³)	2.65E+00	Default value, USEPA, 2002, Equation 4-8
Water-filled Soil Porosity	(L_{water}/L_{soil})	1.50E-01	Default value, USEPA, 2002, Equation 4-8
Total Soil Porosity	(L_{pore}/L_{soil})	4.30E-01	Default value, USEPA, 2002, Equation 4-8
Air-filled Soil Porosity	(L_{air}/L_{soil})	2.80E-01	Default value, USEPA, 2002, Equation 4-8
Dry Soil Bulk Density	(g/cm³)	1.50E+00	Default value, USEPA, 2002, Equation 4-8
Fraction Organic Carbon in Soil	g/g	6.00E-03	Default value, USEPA, 2002, Equation 4-8

Compound	Diffusivity in Air (D _i) (cm ² /s)	Dimensionless Henry's Law Constant (H')	Diffusivity in Water (D _w) (cm²/s)	Soil-Water Partition Coefficent (K _d) (cm³/g)	Soil Organic Carbon Partition Coefficient (K _{oc}) (cm ³ /g)	Apparent Diffusivity (D _A) (cm²/s)
Naphthalene	6.05E-02	1.80E-02	8.38E-06	9.24E+00	1.54E+03	3.67E-08
Trichloroethylene (TCE)	6.87E-02	4.03E-01	1.02E-05	3.64E-01	6.07E+01	2.35E-05
Total Petroleum Hydrocarbons ¹	5.60E-02	2.00E-02	8.16E-06	1.20E+01	2.00E+03	2.90E-08
Vinyl Chloride	1.07E-01	1.14E+00	1.20E-05	1.30E-01	2.17E+01	2.87E-04

Notes:

Apparent diffusivity (Da) calculated using Equation 4-8 (USEPA 2002).

K_d value calculated per USEPA 2002: K_{oc} x F_{oc}

References:

USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. Solid Waste and Emergency Response. OSWER 9355.4-24. December 2002.

Oak Ridge National Laboratory. 2017. Risk Assessment Information System - Chemical Specific Parameters. http://rais.ornl.gov/cgi-bin/tools/TOX_search? select=chem_spef.

¹Values for TPH-aromatic medium fraction utilized.

TABLE C-16 SOIL-TO-AIR VOLATILIZATION FACTORS - VOLATILIZATION FACTOR CALCULATIONS GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

VF(m³/kg) = Q/C ×
$$\frac{(3.14 \times D_A \times T)^{1/2}}{(2 \times \rho_b \times D_A)} \times 10^{-4} (m^2/cm^2)$$

Constituent	DA (cm²/s)	T ¹ (s)	$ ho_{b}$ (g/cm ³)	Volatilization Factor (VF) (m³/kg)
Naphthalene - Industrial Workers/Utility Workers	3.67E-08	7.88E+08	1.50E+00	3.55E+05
Naphthalene - Construction Workers	3.67E-08	3.15E+07	1.50E+00	7.10E+04
Trichloroethylene (TCE) - Industrial Workers/Utility Workers	2.35E-05	7.88E+08	1.50E+00	1.40E+04
Trichloroethylene (TCE) - Construction Workers	2.35E-05	3.15E+07	1.50E+00	2.80E+03
Total Petroleum Hydrocarbons - Industrial Workers/Utility Workers	2.90E-08	7.88E+08	1.50E+00	3.99E+05
Total Petroleum Hydrocarbons - Construction Workers	2.90E-08	3.15E+07	1.50E+00	7.98E+04
Vinyl Chloride - Industrial Workers/Utility Workers	2.87E-04	7.88E+08	1.50E+00	4.01E+03
Vinyl Chloride - Construction Workers	2.87E-04	3.15E+07	1.50E+00	8.03E+02

¹Corresponds to exposure intervals for receptors listed.

Reference:

USEPA. 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. Office of Solid Waste and Emergency Response. OSWER 9355.4-24. December 2002.

TABLE C-17 AREAL DIMENSIONS OF SWMUs/AOCs WITH COPC CONCENTRATIONS ABOVE SCREENING AND/OR BACKGROUND VALUES GE AVIATION EVENDALE FACILITY EVENDALE, OHIO

SWMU/AOC Number	Unit Name	Recommended Further Action ¹	SWMU/AOC area (sq. feet) ²	SWMU/AOC area (acres)
8/12	Temporary Drum Storage Area (Former Bldg. 509) / Drum Crusher Unit	CMS	800	0.018
16	Weigh Station Sump	CMS	9	0.0002
17	Reading Road Landfill	CMS	893000	20.5
18	Sludge Basin Landfill	CMS	20000	0.46
20	Former North Landfarm	CMS	871200	20
21/22	Former 508 Sludge Basin	CMS	28000	0.64
27/28	Former Lime Precipitate Basins 1 and 2	CMS	250000	5.74
31	Lime Precipitate Basin 5	CMS	120000	2.75
87/88	Oil/Water Separators 303-1 and 303-3	CMS	1350	0.031
93/94	Oil/Water Separators 500-1E and 500-1W	CMS	3750	0.086
124	Stormwater Pumphouse 506	CMS	1375	0.032
141	Gravel Media Coalescing Separator	CMS	300	0.007
142	Bldg. 800 Machine Sump (Added 1/16/91)	CMS	1600	0.037
AOCs D and I	Bldg. B Fuel Spills No. 1 and 2	CMS	1200	0.028
AOC L	Bldg. 304 Fuel Spill	CMS	1000	0.023
AOC W3 / SWMUs 64/68	Inactive Underground Product Storage Tanks 515-1 to 27	CMS	16000	0.38
AOC W4 / SWMU 65	Inactive Underground Product Storage Tanks 507-5,6,13,14	CMS	2100	0.048
AOC W10 / SWMU 72	Inactive Underground Product Storage Tanks D-1 to 5	CMS	13000	0.298
AOC LD	Bldg. 700 South Loading Dock	CMS	1000	0.023
AOC PST	TCE/TCA Product Storage Tanks	CMS	1750	0.040

Total area (acres) = 51.2

⁽¹⁾ CMS - Corrective Measures Study

⁽²⁾ Source: O'Brien & Gere. 1995. RCRA Facility Investigation Report.